TECHNOLOGY UTILIZATION IN A NON-URBAN REGION: FURTHER IMPACT AND TECHNIQUE OF THE TECHNOLOGY USE STUDIES CENTER (7)

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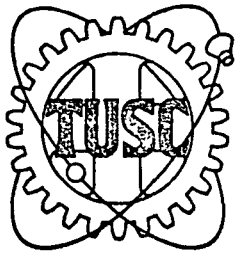
SUSAN G. WEST
Administrative Assistant and Secretary

FINAL REPORT, NASW-2881

December 1976

TECHNOLOGY USE STUDIES CENTER
SOUTHEASTERN OKLAHOMA STATE UNIVERSITY
DURANT, OKLAHOMA 74701



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ACKNOWLEDGEMENTS

As a routine practice and policy of the Technology Use Studies Center, all of the Center personnel, in one way or another, participate in the preparation of various status reports--this annual report of work accomplishments, services, etc., is no exception.

With regard to the detail and written content of the report, Mr. Bill Dodd, Industrial Specialist, and Mrs. Susan West, Administrative Assistant and Secretary, deserve special recognition.

Other TUSC personnel who provided valuable assistance in preparaing the report include A. M. Moore, Senior Industrial Specialist; Ben Dye, Bob Dye, John Martin, and Sabre Tice, Informational Retrieval Assistants; and Deborah McCall, Sherry Rider, and Teresa Smith, Clerical Assistants. Mr. Moore's understanding of the TU Program and his tenure with TUSC makes him a valuable resource and consultant in preparing a report such as this one.

C. Henry Gold
Director

January 1977

SUMMARY

NASA Contract NASW-2881 requires that the Technology Use Studies Center (TUSC) submit a Final (annual) Report as set forth in Article III.

As in previous annual reports, Chapter I provides the reader with updated information pertaining to TUSC clients who are those that receive/use information as disseminated by the Center. The client information is presented as a continuation of client data as set forth in the Center's previous annual reports.

The TUSC contract year ended December 31, 1976. The quarterly status report (QSR) requirement has been complied with; three reports (QSR #41, 42, and 43) have been submitted per contract specifications. This Annual Report is a record of TUSC accomplishments during the final quarter (October, November, and December 1976). It also summarizes TUSC services and Technology Utilization Program efforts/accomplishments during the contract year.

Chapters II, III, IV, and V correspond with our Statement of Work as provided in Article I; namely, Dissemination and Assistance, Faculty Information Service, Cooperation with Other Agencies, and General Aviation News Letter.

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Chapter I

TUSC CLIENTELE INFORMATION

For Final Report purposes, the Center adopted a standardized reporting format several years ago which provides for the continuation and updating of data that especially pertains to this chapter and the one that follows. One of the more logical questions a reader might ask is, "Who is a TUSC client?" We use the term "client" to mean firm, agency, or individual(s) for whom or with whom there has been an information interchange. That is, a client is anyone who requested (and received) information or a service of TUSC.

Tables I, IV, and VI to follow specifically provide the reader with an identification and classification of TUSC clients relative to the category of Firm, Individual, or Special. Special clients include research organizations; also included are local, state, and federal agencies. As reported previously, one such client is the Small Business Administration (SBA). TUSC's primary contact with the SBA is through Mr. S. Charles Pierce, the Region VI Technology Assistance Officer. As stated in our reports over the past six years, Mr. Pierce is a real credit, not only to the concept of technology transfer, but more so to the application and means whereby technology is actually transferred from one sector of the Nation's economy to another.

Since "economy" is a current national issue, TUSC is proud of its record and efforts toward expansion of interagency cooperation and exchange of NASA Technology.

TABLE I

NUMBER OF NEW TUSC CLIENTS BY CLASSIFICATION AND YEAR

Year	Firms		Special		Individuals	
1964	9	(cum)	--	(cum)	--	(cum)
1965	12	21	--	--	8	8
1966	37	58	--	--	11	19
1967	21	77	--	--	10	29
1968	22	99	10	10	39	68
1969	34	133	9	19	32	100
1970	21	154	16	35	36	136
1971	11	165	2	37	40	176
1972	6	171	7	44	46	222
1973	4	175	4	48	19	241
1974	11	186	9	57	45	286
1975	5	191	5	62	80	366
1976	2	193	1	63	60	426

TABLE II

TUSC CLIENT FIRMS, BY NUMBER OF EMPLOYEES

Number of Employees	Number of Firms
Below 25	107
25-49	26
50-99	26
100-245	14
250-499	9
500 and over	11
Total	193

TABLE III

COMPOSITION OF TUSC CLIENT FIRMS, BY TYPE OF FIRM

Item	Number
Services	47
Mining	3
Manufacturing	143
TOTAL	193

TABLE IV

TUSC CLIENTS BY GEOGRAPHIC LOCATION

	Firms	Individuals	Special
Oklahoma Project Area (19 counties)	108	336	31
Remainder of Oklahoma	54	32	14
Texas Project Area (15 counties)	10	22	1
Remainder of Texas	12	22	4
Other States	9	14	13
TOTAL	193	426	63

NOTE: A map of TUSC's Project Area is included as Appendix A.

TABLE V

MANUFACTURING FIRMS BY SIC CLASSIFICATION

Two Digit SIC Classification		Number of Clients*
13	Crude Petroleum and Natural Gas	2
19	Ordnance and Accessories	0
20	Food and Kindred Products	7
22	Textile Mill Products	1
23	Apparel and Other Finished Products Made from Fabrics and Similar Materials	4
24	Lumber and Wood Products, except Furniture	5
25	Furniture and Fixtures	4
26	Paper and Allied Products	4
27	Printing, Publishing and Allied Products	2
28	Chemical and Allied Products	6
29	Petroleum Refining and Related Industries	4
30	Rubber and Miscellaneous Plastic Products	11
31	Leather and Leather Products	2
32	Stone, Clay and Glass Products	12
33	Primary Metal Industries	7
34	Fabricated Metal Products, except Ordnance, Machinery and Transportation Equipment	23
35	Machinery, except Electrical	33
36	Electrical Machinery, Equipment and Supplies	14
37	Transportation Equipment	12
38	Professional, Scientific and Controlling Instruments: Photographic and Optical Goods; Watches and Clocks	9
39	Miscellaneous Manufacturing Industries	13

*Total will not equal 143 because some firms have more than one manufacturing classification.

TABLE VI

RECIPIENTS OF TUSC SERVICE

Classification of Recipient	Number of Recipients	Number of Searches*
Firms	193	407
Individuals:		
Southeastern State University	262	395
East Central State University	8	18
Oklahoma State University	9	18
University of Oklahoma	5	22
Other Oklahoma Colleges	9	33
Texas Colleges	14	19
Other Colleges	4	4
Other Individuals	115	162
Special	63	998
TOTAL	682	2,076

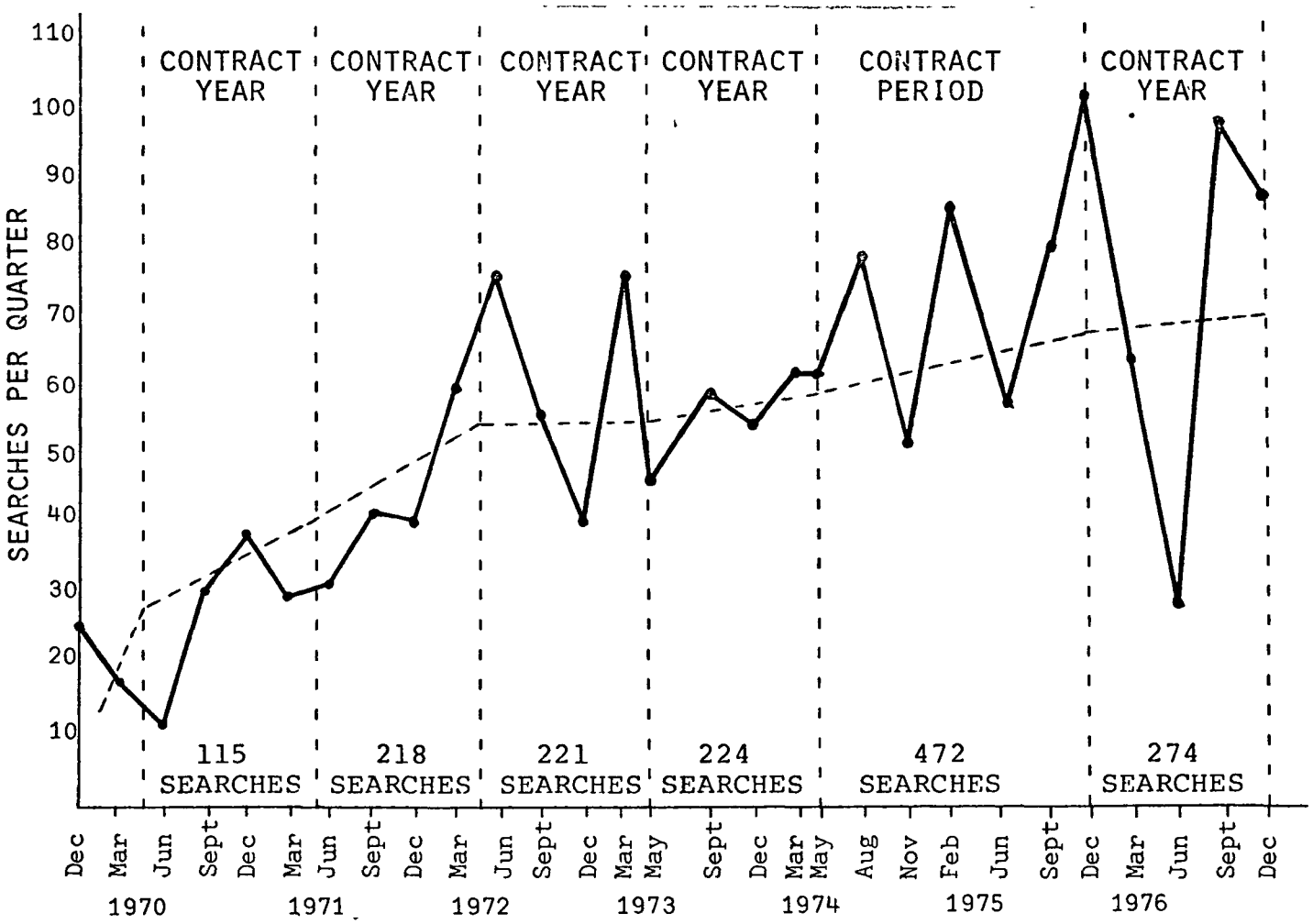
*All requests (for searches and assistance) are included in the "Number of Searches" column (including general or non-technical information requests); therefore, the total number of searches reflected in this table will not coincide with the total number of searches as reported in Appendix B.

CHAPTER II

DISSEMINATION AND ASSISTANCE

The contractor shall disseminate information and provide technical assistance to industrial firms and other organizations.... This dissemination and assistance service shall be provided in a manner designed to bring about the utilization of NASA-generated technology by recipients and to promote a better understanding of the process by which such technology is made available... (Statement of Work, NASw-2881)

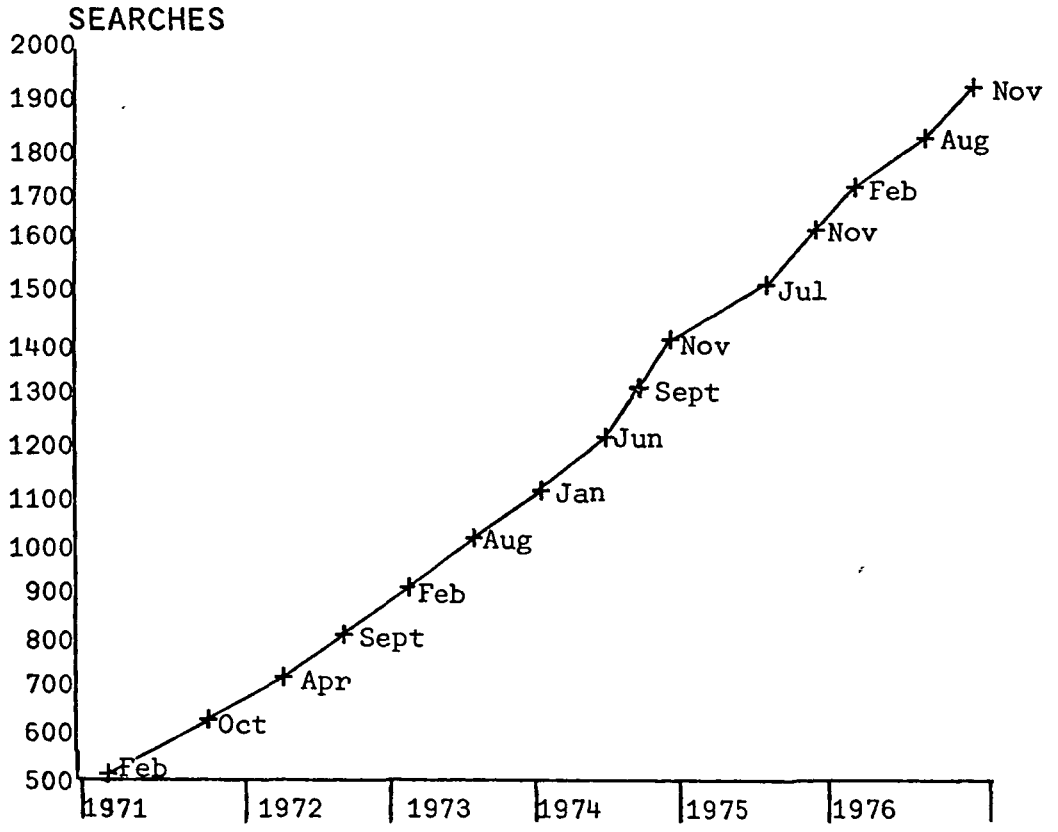
TUSC PERFORMANCE CHART



The TUSC Performance Chart on the previous page provides statistical data relative to the Center's search accomplishments on both a quarterly and an annual basis.

The Search History and Accomplishment Chart below indicates the trend of the Center's dissemination/assistance service since 1971; i.e., approximately 1,400 searches. From September 1966 to December 1970, TUSC processed (and recorded) the first 500 searches. (Searches were not recorded prior to September 1966.) In other words, the search production rate by TUSC was

SEARCH HISTORY AND ACCOMPLISHMENTS
BY TUSC PER CALENDAR YEAR



approximately 100 per year through December, 1970. Based on the trend as previously mentioned, the production rate increased to an average of 230 searches per year or 1,400 searches in six years. A further analysis of this trend indicates that the Center increased its average production rate to approximately 300 searches per year during the past three years.

TUSC's record of accomplishment, relative to searches completed for the last quarter of the contract year shows that 86 searches were processed. Added to previous quarters, TUSC processed 274 searches in 1976. For reader information, a calendar-year comparison of search accomplishment was tabulated and set forth in the 1975 Final Report (see page 9). It is deemed appropriate to retain report continuity by updating and repeating the search information as follows:

Year	No. of Searches
1976	274
1975	324
1974	293
1973	201
1972	229
1971	142

Based on the above statistics, TUSC has processed approximately 270 searches per year during the past four years using manual retrieval techniques and a team of part-time student Information Retrieval Assistants. Some time ago, we estimated that the Center's realistic capability was 220 searches per year because of identifiable constraints; i.e., manpower, fiscal, retrieval, and geographical limitations. The primary factor affecting the 50 searches per

year overproduction has been better understanding and more utilization of the TUSC library by faculty and students--people who obtain benefits of the TU program on a self-help basis (Center personnel assist, but the individual does his or her own literature search). Also, after you have answered almost 2000 technical questions, the questions start to be more and more in the nature of repeat questions. This means the search is merely a matter of updating a previous search since TUSC maintains a record of all searches processed and information retrieved.

As part of the RFP that led to the award of TUSC's 1976 contract, we included a request for a RECON terminal; however, written authorization to acquire it was not received until September (see page 50). Being an arm of Southeastern Oklahoma State University, which is a member of the Oklahoma State Regents of Higher Education, it was necessary to purchase the terminal on open bid through the services of the Central Purchasing Division of the State Board of Affairs. This procurement procedure led to a delay in our receipt of the terminal; it was delivered on December 1, 1976. However, in anticipation of RECON terminal delivery, TUSC contacted Lockheed and SDC to finalize user requirements and contracted for computer services. Also, Mrs. Susan West, TUSC's Administrative Assistant, made arrangements for a one-day training session at NTIS--it was completed during the Christmas break. Therefore, this report is silent relative to TUSC's experience/utilization of the RECON terminal. A report relative thereto will be included in the forthcoming QSR #44 and subsequent reports.

Quarterly Status Reports #41, #42, and #43 provide data pertaining to the Center's accomplishments during the first three quarters of 1976. October-December data is included in this report. Furthermore, the Center submitted its required Management Information Reports (MIR) for each quarter as set forth in the NASA (KT) letter of March 19, 1975. One of the most important aspects of the MIR is that IAC's document and report Client Benefits from services and/or assistance rendered. It is an excellent measure of NASA's basic charter; i.e., "...provide for the widest practical and appropriate dissemination of information concerning its activities and the results thereof."

During the contract year TUSC documented the following Class A Benefits (those wherein the client states a specific benefit) and Class B Benefits (those wherein the client expresses appreciation for services but does not pinpoint specifically how or where information or service is of benefit):

	Class A Benefits	Class B Benefits
1976	15	33
1975	4	17

Class A Benefits are considered to be NASA TU Transfers and are reportable items in the Center's Quarterly Status Report. The transfers accomplished during the 1976 fourth quarter are included in this report.

Transfer 198 -- Thin film technology including tantalum nitride resistors ...(Search 1864). The thin film products manager of Micropac Industries, Inc., in his letter (page 62), states that "the most useful information was the NASA-literature search No. 32890 on thin film technology. There were 44

directly applicable articles relating to the company's problem. TUSC documented a telephone request for assistance from Mr. Ogan, the products manager, on page 59 of QSR #43. We were informed by Mr. Ogan that this was the exact document he had been unable to obtain from NTIS.

Transfer 199 -- Sealing kovar lids to hybrid packages using tin/gold (Search 1867); edge around techniques for thick film hybrid ceramics (Search 1868); and internal stress in 96% alumina ceramics (Search 1826). Good documentation was received from the manager of Manufacturing Engineering at Micropac Industries, Inc., (page 63), in which he states that he used the information provided to "apply to and solve a half a dozen other problems."

Transfer 200 -- Solar energy and solar cells (Search 1123); and solar cells, SOTA (Search 1307). The owner of the company, W. A. Moore Engineering, provided informal documentation that "we used the material regularly" and that "we probably will want it again." (page 64)

TUSC reported eight Class B benefits during the quarter; they resulted from the following search requests:

Search 1817 -- Aluminum oxide waste disposal. The president of W/S Finishing Corporation expresses appreciation for information provided, indicates that the firm plans to pursue some of the solar energy ideas presented, and will endeavor to use the information. (page 65).

Searches 1820, 1843, and 1845 -- Detection, testing, and identification techniques or methods for pesticides and bacteria in water, and for drugs in

the blood and urine. Enviro-Med Laboratories, Inc., expressed appreciation for information received (page 66).

Searches 1805, 1819, 1828, 1829, and 1837 -- Energy related topics. Edahow Electronics, Inc., expressed appreciation for assistance; i.e., "it was of GREAT help to us." The firm indicates an intention to continue its use of services/assistance available (page 67).

Search 1879 -- Computerized programs for design of pressure vessels, pipe flexibility, expansion joints or expansion bellows. Stress Technology & Products, Inc., expressed a strong interest in government developed software relating to stress analysis and expressed appreciation for assistance provided (page 68).

Search 1774 -- Solar energy. Mr. Arthur Judd, president, D - Co - Inc., expressed appreciation of solar energy literature received and states that his firm obtained necessary references for the purpose intended (page 69).

Searches 1808, 1822, 1827, and 1877 -- Energy related topics. The technical director of Magna Cool Corporation provides good documentation of the value of TU services. "Our main interest, which has been fully met, was to gain as much information as possible on the state-of-the art..." (page 70).

Searches 1838 and 1842 -- Geothermal energy. The Fann Instrument Corporation expressed appreciation for services and states that information on high temperature seals will be very helpful (page 71).

TUSC received a "thank you" letter from the SBA Technology Assistance Officer of Region VI for TUSC assistance. It was the second such letter received from the SBA during the fourth quarter (page 72).

Energy related information requests have been noted in previous quarterly and annual reports as high interest items. As for 1976, there is no doubt that alternate sources of energy and corresponding technologies are rated as the number one category in clientele interest. The number of energy-related searches accomplished by the Center during 1976 was a little more than one-third of the total number of all searches processed. Other areas of high interest, as reflected by search requests, include: aerodynamics, bonding, electrical applications, laser technology, metallurgy, waste disposal/pollution, and wastewater/water related concerns. Some of the searches that were completed and correspond to the list of above-mentioned areas of interest were:

Aerodynamics -- Searches 1672, 1677, 1695, 1762, 1765, 1766, 1844, 1923, and 1929.

Bonding -- Searches 1687, 1705, 1763, 1790, 1815, 1866, 1919, and 1922.

Electrical applications -- Searches 1706, 1709, 1710, 1712, 1737, 1741, 1750, 1823, 1827, 1840, 1848, 1856, and 1866.

Laser Technology -- Searches 1791, 1886, 1892, 1894, 1918, 1927, 1930, 1932, and 1935.

Metallurgy -- Searches 1681, 1683, 1688, 1723, 1730, 1747, 1753, 1759, 1796, 1848, 1860, 1867, and 1880.

Waste disposal/pollution -- Searches 1694, 1715, 1726, 1732, 1736, 1748, 1787, 1788, 1789, 1817, 1853, 1857, 1900, 1901, 1902, 1912, and 1916.

Wastewater/water -- Searches 1704, 1725, 1742, 1744, 1760, 1813, 1814, 1828, 1833, 1835, 1836, 1843, 1845, 1849, 1865, and 1915.

The Center has maintained an interest and accomplished searches in support of the University Wastewater Treatment Facility throughout the past three years. TUSC makes routine reports of progress in the development of the system in the Center's QSR's and Final Reports; i.e., pages 57-60 in the 1974 annual report and pages 12, 13, and 120 in our report last year. In QSR #43, TUSC reported that construction/installation of the water transfer system was completed, which means that we now have a direct linkage between the community's sewage treatment plant (final clarifier) and the University's Wastewater Treatment Facility. Pump capacity as originally installed was 750 gallons per minute (gpm); however, work is in progress to install an additional pump having a 1,650 gpm capacity. Early indications of the effectiveness of the wastewater treatment system have been extremely encouraging; i.e., without the benefit of long-term, day-to-day water quality data needed for scientific verification, it would be premature to report on specific results; but those involved in the sewage treatment system state that improvement in water quality is almost unbelievable. A conservative estimate of water quality

is that the biochemical oxygen demand (BOD) is improved by a factor of 100%--this is based on checking BOD levels of water that have progressed through the lagoon system with BOD levels of sewage water entering the system. In summary, all secondary effluent from the City Sewage Plant flows through the wastewater treatment lagoon system before it is discharged into nearby Mineral Bayou, then into two rivers. The above estimate of improved water quality exceeds that which is reported in QSR #43 (pages 14-15), but the goal remains unchanged; i.e., inexpensively reclaim wastewater to a potable state, which is basically that which meets EPA standards. More accurate and detailed reporting relative hereto will be included in future QSR/Final reports.

Cooperative efforts continue relative to the installation of a six-lagoon wastewater treatment system at nearby Grayson County College (Texas) as reported in the Center's 1975 Final Report (page 13). The Texas project has been a spin-off from the University Biological Department's project. TUSC provided search services and information in support of the project in its early stages of development. As reflected previously on page 15, wastewater/water related searches continue to be one of the high interest subjects of our clients.

See Appendix B for a chronological listing of searches accomplished by the Center during the contract year. Appendix C contains "Transfer and Impact Reports," a compilation of letters from TU clients responding to the value of Technology Utilization.

CHAPTER III

FACULTY INFORMATION SERVICES

> The Contractor shall continue to provide information services to selected faculty research personnel in a variety of technical disciplines at Southeastern Oklahoma State University, Oklahoma State University, the University of Oklahoma and other state colleges and universities. (Statement of Work, NASw-2881)

The level of Faculty Information Services by TUSC continues to be consistent with that which has been previously reported; i.e., approximately 25% of the search effort (75 searches) during 1976 provided support within this functional area of the Center's responsibility.

In Chapter II it was mentioned that we now have a RECON computer terminal. This added capability gives not only promise but evidence of a closer working relationship between TUSC and the University faculty. For example: When the unit arrived, a member of the Computer Sciences Department attempted to initiate a search via the terminal but was unable to do so due to a malfunction in the terminal. His analysis was later confirmed when it was checked out by a Texas Instrument service technician. It was necessary to replace one of the primary solid state circuit boards in the terminal to correct the malfunction. Other members of the faculty are extremely interested in the terminal. We can foresee a benefit to TUSC, NASA, and clients

from the faculty as they are more than willing to donate their services to help us develop a search strategy in particular disciplines and especially in fields of study where specialized knowledge is required just to understand "key" words.

We credit the faculty for developing interest in topics related to water reclaimation; the search requests concerning this topic have come from various individuals having an interest in the University Wastewater Treatment project.

The Center's library is now a routine resource for the University Debate Team--searches 1810, 1872, 1888, and 1924 provided resource information for the Debate Team during the contract year.

TUSC is also an information resource to those who have an interest in the technical or legal aspects of the Occupational Safety and Health Administration (OSHA) and Public Law 92-261, which is the Equal Employment Opportunity Act of 1972; also Executive Order 11246 which covers all federal contractors/subcontractors that might not otherwise be included under Public Law 92-261.

Cooperative efforts with Grayson County College was mentioned in Chapter II. Formal correspondence between the Center and the Cooke County Environmental Agency (pages 74-75) resulted from information interchange with Grayson County College.

CHAPTER IV

COOPERATION WITH OTHER AGENCIES

> The Contractor shall continue to work closely with and attempt to develop new cooperative efforts with (1) institutions operating under or in conjunction with the Oklahoma State Technical Services Program, (2) organizations established under the Public Works and Economic Development Act of 1965, and (3) other public and private organizations and institutions concerned with promoting the economic and technological development of the region. (Statement of Work, NASw-2881)

Small Business Administration

Included in Appendix C are documentation letters from small business firms that were forwarded to TUSC by the Region VI Technology Assistance Officer. The long-standing cooperative effort between the Center, the SBA, and SBA clients has proven to be an effective and highly successful means whereby the NASA TU program and benefits therefrom have been expanded without duplication of effort and add-on expenses to the taxpayer. The Center is therefore quite proud of its close working relationship with the SBA which has been developed over the past six years of TUSC's operation. A total of 190 searches processed during the contract year resulted from the SBA/TUSC cooperative effort; it represents approximately 70% of the Center's annual search production.

Department of Labor

Although the Center does not have a formal (or informal) working relationship with the DOL, TUSC is nonetheless an information resource to clients who have need for information relating to the Occupational Safety and Health Act and the Equal Employment Opportunity Act.

Environmental Protection Agency

The University's Wastewater Treatment System (Chapter II, page 15) is being monitored by the EPA, the Statement Department of Health, and the City Water Department. The Center has been an information resource not only for technical reports relative to water purification methods/systems but also a contact point for clients who have an interest in the University's project; i.e., note page 73 in Appendix C, a reprint of a previously reported item.

Department of the Interior

TUSC reported its involvement with the University Mobile Mine Safety program in the 1975 Annual Report (page 121). The Center has continued to provide search services and assistance in support of this worthwhile community-oriented program.

CHAPTER V

GENERAL AVIATION NEWS LETTER

> The contractor shall prepare and distribute a newsletter directed to the general aviation audience. This newsletter should be issued quarterly during the period of performance of this contract. (Statement of Work, NASw-2881)

Background information pertaining to the Statement of Work shown above is set forth in the Center's 1974 Final Report (Appendix D, page 62) and the 1975 Final Report (Chapter V, page 23, and Appendix D, page 127). Since TUSC was instrumental in developing the Aviation Degree program offered by the host institution, the Center has naturally maintained a very strong interest in "aeronautics" in general. During recent years it has been interesting to note that much has been said and written about a new emphasis on the first "A" in NASA. TUSC has been an aeronautics booster since 1966--the year that Southeastern Oklahoma State University started its Aviation Degree program. A survey of General Aviation enthusiasts in 1973 provided evidence that TUSC could effectively enlarge its service and broaden the base of NASA's TU program. We are confident that the General Aviation News Letter is accomplishing our goal of presenting infomation about aeronautical projects, research, development, etc., in non-engineer language for that segment of the aviation world known collectively as general aviation. Included in this group are

aviation educators, state aeronautics commissions, airport planners, private/ commercial pilots, flying associations, aviation publications, etc. There are more people involved in the general aviation aspects of flying than in all other types of flying. In other words, there are far more registered aircraft that belong to individuals (or businesses) than those that are included in the fleet of aircraft operated by commercial airline companies.

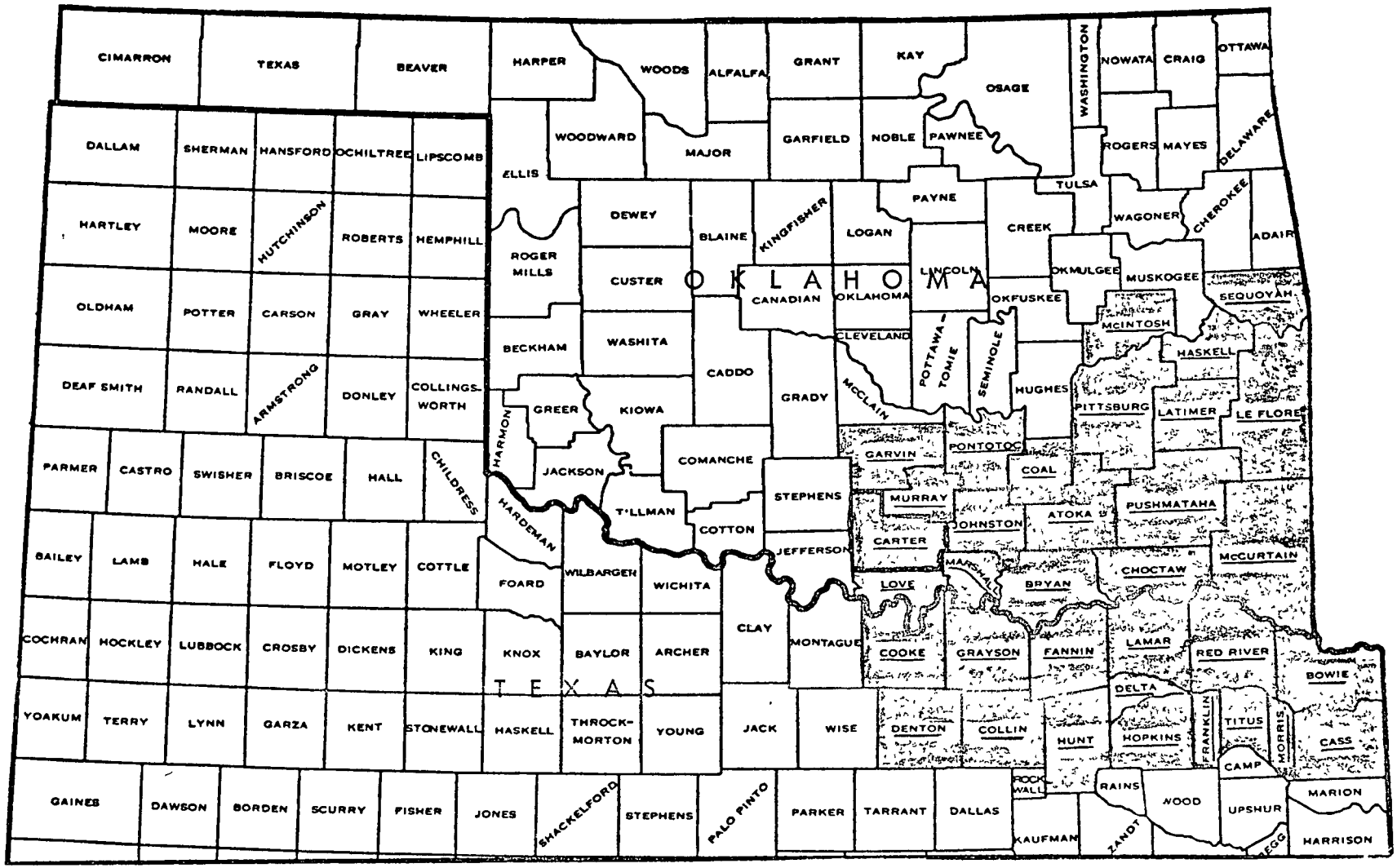
The News Letter is a medium or catalyst that has brought about a natural linkage between TUSC and various NASA Field Centers. Valuable information about the status of projects and/or clarification of NASA reports have been shared with Mr. Moore, editor of the News Letter, through contacts with TU representatives at the Field Centers. Mr. Moore also maintains his membership in the National Aerospace Writers Association, National Business Aircraft Association, and National Agricultural Aviation Association. In December, Mr. Moore attended the annual meeting of the National Ag Aviation Association.

The most recent issue of the TUSC General Aviation News Letter (Volume III, No. 4) was published and distributed in December 1976. It has been reproduced and is included in Appendix D (pages 92-96), in addition to correspondence relating to the News Letter.

APPENDIX A

TUSC PROJECT AREA

TUSC PROJECT AREA



Scale - Statute Miles

0 100 200 300

APPENDIX B

SUMMARY CHARACTERISTICS OF TUSC TECHNICAL SEARCHES

SUMMARY CHARACTERISTICS OF TUSC TECHNICAL SEARCHES

SEARCH NUMBER	SEARCH SUBJECT	SIC	CLIENT	LOCATION OF CLIENT
1672	Information on heliballoons, blimps, airships, and zeppelins including characteristic curves for balloons and lift factor versus volume	I-T	S. Charles Pierce, SBA	Dallas, TX
1673	Information on the uses, markets, and economics of dolomite	I-T	S. Charles Pierce, SBA	Dallas, TX
1674	Secondary uses of "bottom ash" that results from burning of lignite by power plants	I-T	S. Charles Pierce, SBA	Dallas, TX
1675	Uses and methods for calcining coke	I-T	S. Charles Pierce, SBA	Dallas, TX
1676	Strip mine reclamation including various methods, economics, and equipment used	I-T	S. Charles Pierce, SBA	Dallas, TX
1677	Commercial use of lighter-than-air aircraft	I-T	S. Charles Pierce, SBA	Dallas, TX
1678	Earth reference magnetic compass	I-T	S. Charles Pierce, SBA	Dallas, TX

I-S -- An individual student
I-T -- Any individual who is working in technology research for a government agency
I-F -- An individual faculty member
I-O -- Any other individual who is not employed by a manufacturing firm, agency, or a school system

NOTE: Unless otherwise indicated, client is located in the State of Oklahoma.

SEARCH NUMBER	SEARCH SUBJECT	SIC	CLIENT	LOCATION OF CLIENT
1679	SOTA, coal gasification or lignite gasification	I-T	S. Charles Pierce, SBA	Dallas, TX
1680	Coal/lignite gasification equipment and processes	I-T	S. Charles Pierce, SBA	Dallas, TX
1681	Fluorocarbon impregnation of metals	I-T	S. Charles Pierce, SBA	Dallas, TX
1682	Solar energy	I-T	S. Charles Pierce, SBA	Dallas, TX
1683	Triballoy	I-T	S. Charles Pierce, SBA	Dallas, TX
1684	Methods to improve the efficiency that cattle can convert feed to animal weight	I-O	Durant Animal Hospital	Durant
1685	Methods and equipment to pump liquid coal	I-T	S. Charles Pierce, SBA	Dallas, TX
1686	Methods and equipment used to pump liquid concrete	I-T	S. Charles Pierce, SBA	Dallas, TX
1687	Plastic; adhesive and bonding	I-T	S. Charles Pierce, SBA	Dallas, TX
1688	Welding procedures for exotic metals	I-T	S. Charles Pierce, SBA	Dallas, TX
1689	Methods and equipment required to liquify coal	I-T	S. Charles Pierce, SBA	Dallas, TX
1690	Plasma arc welding and cutting	I-T	S. Charles Pierce, SBA	Dallas, TX
1691	SOTA, fiberglass molding techniques, equipment and products	I-T	S. Charles Pierce, SBA	Dallas, TX

SEARCH NUMBER	SEARCH SUBJECT	SIC	CLIENT	LOCATION OF CLIENT
1692	SOTA, drying or kiln operation for clay brick	I-T	S. Charles Pierce, SBA	Dallas, TX
1693	SOTA, PCB Technology	I-T	S. Charles Pierce, SBA	Dallas, TX
1694	Air pollution	I-O	Clyde Ann LaCron	Broken Bow
1695	SOTA, propellers, propeller design, testing	I-T	S. Charles Pierce, SBA	Dallas, TX
1696	EEO Advertising requirements	I-F	Paul Wiley, SOSU	Durant
1697	SOTA, insulation technology applicable to commercial and residential heating/air conditioning	I-T	S. Charles Pierce, SBA	Dallas, TX
1698	Benefits of improved insulation	I-T	S. Charles Pierce, SBA	Dallas, TX
1699	New technology on heating and air conditioning systems	I-T	S. Charles Pierce, SBA	Dallas, TX
1700	Improved conservation of energy in commercial and residential heating/air conditioning	I-T	S. Charles Pierce, SBA	Dallas, TX
1701	Detection methods and measurement of hydrogen sulfide	I-T	S. Charles Pierce, SBA	Dallas, TX
1702	Available instrumentation for measurement of H_2S	I-T	S. Charles Pierce, SBA	Dallas, TX
1703	Volumetric properties of gases such as argon outside normally reported range of pressure and temperature	33	Hamilton Metal & Welding Co.	Caddo

SEARCH NUMBER	SEARCH SUBJECT	SIC	CLIENT	LOCATION OF CLIENT
1704	SOTA, evaporative desalinization units, methods, equipment, and procedures	I-T	S. Charles Pierce, SBA	Dallas, TX
1705	Improved methods for joining brass to copper	I-T	S. Charles Pierce, SBA	Dallas, TX
1706	Cyrogenic-electricity and electrical power	I-T	S. Charles Pierce, SBA	Dallas, TX
1707	Pumps, cryogenic	I-T	S. Charles Pierce, SBA	Dallas, TX
1708	Solder additives that improve conductivity characteritics	I-T	S. Charles Pierce, SBA	Dallas, TX
1709	Electric motors, superconductive	I-T	S. Charles Pierce, SBA	Dallas, TX
1710	Electro-magnets, superconductive	I-T	S. Charles Pierce, SBA	Dallas, TX
1711	Bearings, cryogenic	I-T	S. Charles Pierce, SBA	Dallas, TX
1712	Electric generators, superconductive	I-T	S. Charles Pierce, SBA	Dallas, TX
1713	Methods and equipment used for calcining coke	I-T	S. Charles Pierce, SBA	Dallas, TX
1714	Solar energy for heating and air conditioning	I-T	S. Charles Pierce, SBA	Dallas, TX
1715	Disposal of electroplating plant effluent	I-T	S. Charles Pierce, SBA	Dallas, TX
1716	Design of solar panels and collectors or residential and commercial use.	I-T	S. Charles Pierce, SBA	Dallas, TX
1717	Solar energy in commercial and industrial air conditioning and heating	I-T	S. Charles Pierce, SBA	Dallas, TX

SEARCH NUMBER	SEARCH SUBJECT	SIC	CLIENT	LOCATION OF CLIENT
1718	Calcining iron ore	I-T	S. Charles Pierce, SBA	Dallas, TX
1719	Solar energy in heating and air conditioning	I-T	S. Charles Pierce, SBA	Dallas, TX
1720	Commercial applications of barite and its sources	I-T	S. Charles Pierce, SBA	Dallas, TX
1721	SOTA, converting equipment burners from natural gas to coal, oil, and/or other alternate fuels	I-T	S. Charles Pierce, SBA	Dallas, TX
1722	Information about Title IX as it relates to athletics	I-F	Dr. Don Parham, SOSU	Durant
1723	Welding and fabrication of ultra-high strength steel alloy	37	TK International	Tulsa
1724	Energy conservation measures successfully adopted in various manufacturing operations	I-T	S. Charles Pierce, SBA	Dallas, TX
1725	EPA standards pertaining to air/water pollution for galvanizing plants	I-T	S. Charles Pierce, SBA	Dallas, TX
1726	Methods of diposing of hardwood sawdust and slabs	I-T	S. Charles Pierce, SBA	Dallas, TX
1727	Hydrogen as an alternate to present fuels	I-T	S. Charles Pierce, SBA	Dallas, TX
1728	Conversion of wind energy into useful energy	I-T	S. Charles Pierce, SBA	Dallas, TX
1729	Conversion of solar energy into useful energy	I-T	S. Charles Pierce, SBA	Dallas, TX

SEARCH NUMBER	SEARCH SUBJECT	SIC	CLIENT	LOCATION OF CLIENT
1730	Equipment and methods used in the galvanizing process	I-T	S. Charles Pierce, SBA	Dallas, TX
1731	Methods and equipment available for energy conservation	I-T	S. Charles Pierce, SBA	Dallas, TX
1732	Methods and equipment for removal of hydrocarbon wastes	I-T	S. Charles Pierce, SBA	Dallas, TX
1733	Alternate fuels to replace present fuels	I-T	S. Charles Pierce, SBA	Dallas, TX
1734	SOTA, telephone systems	I-T	S. Charles Pierce, SBA	Dallas, TX
1735	SOTA, roof coatings	I-T	S. Charles Pierce, SBA	Dallas, TX
1736	Solid waste disposal methods for copper and iron sulfates	I-T	S. Charles Pierce, SBA	Dallas, TX
1737	Electricity generation	I-T	S. Charles Pierce, SBA	Dallas, TX
1738	Solar collector systems	I-T	S. Charles Pierce, SBA	Dallas, TX
1739	Wind generators	I-T	S. Charles Pierce, SBA	Dallas, TX
1740	Solar heating and air conditioning equipment	I-T	S. Charles Pierce, SBA	Dallas, TX
1741	SOTA, electronics especially in the area of logic or digital	I-F	Harold Lynn, SOSU	Durant

SEARCH NUMBER	SEARCH SUBJECT	SIC	CLIENT	LOCATION OF CLIENT
1742	Methods or equipment used to detect/remove chrome, cadmium, etc., in treating metal finishing waste water	I-T	S. Charles Pierce, SBA	Dallas, TX
1743	Solar heating and air conditioning equipment	I-O	Edward W. Hunnicutt	Durant
1744	Use of raw sewage or sewer sludge for organic fertilizer	I-T	S. Charles Pierce, SBA	Dallas, TX
1745	Alternate fuel or alternate system to generate the required steam for curing concrete	I-T	S. Charles Pierce, SBA	Dallas, TX
1746	Manufacturer of wooden 2-1/2" drapery rings	31	R & S Leather Company	Durant
1746A	Food/drink preservatives	I-T	S. Charles Pierce, SBA	Dallas, TX
1747	Welding processes of titanium alloys	I-F	Jack Brock Broken Bow High School	Broken Bow
1748	Methods and equipment used in composting of organic wastes to produce organic fertilizer	I-T	S. Charles Pierce, SBA	Dallas, TX
1749	Marijuana	I-F	John Krattiger, SOSU	Durant
1750	Methods or equipment used to eliminate air pollution in the manufacture of PCB	I-T	S. Charles Pierce, SBA	Dallas, TX
1751	Wind generators and component parts wherein galvanizing is appropriate and suitable	I-T	S. Charles Pierce, SBA	Dallas, TX

SEARCH NUMBER	SEARCH SUBJECT	SIC	CLIENT	LOCATION OF CLIENT
1752	Design of jigs and templates	I-T	S. Charles Pierce, SBA	Dallas, TX
1753	Metal coatings (for steel valves) that afford protection against hydrogen sulfide	I-T	S. Charles Pierce, SBA	Dallas, TX
1754	Management and technology assistance information for a cattle feeding operation	I-O	George Hill	Coalgate
1755	Purchasing leather goods	31	R & S Leather Company	Durant
1756	Manufacturer of three plastic injection molding components for a patented item	I-T	S. Charles Pierce, SBA	Dallas, TX
1757	Energy substitutes for natural gas for industrial application	I-T	S. Charles Pierce, SBA	Dallas, TX
1758	Applications of ethyl caproate as a food flavoring agent	I-F	Dr. John R. Wright, SOSU	Durant
1759	SOTA, corrosion prevention	I-O	Wendell Hale	Dallas, TX
1760	Methods or equipment used to eliminate water pollution in the manufacture of PCB	I-T	S. Charles Pierce, SBA	Dallas, TX
1761	Conversion to Metric system	I-F	Dr. Paula Platter, SOSU	Durant
1762	Helicopter Tail Rotor Relocation	I-T	S. Charles Pierce, SBA	Dallas, TX
1763	Adhesives/bonding of aluminum extrusions	I-T	S. Charles Pierce, SBA	Dallas, TX

SEARCH NUMBER	SEARCH SUBJECT	SIC	CLIENT	LOCATION OF CLIENT
1764	Method for neutralizing and/or removing insecticide/herbicide residue from vegetable oil	20	Anderson-Clayton Co	Sherman, TX
1765	Elastomeric couplings	I-T	S. Charles Pierce, SBA	Dallas, TX
1766	Ball bearings and bearing materials used in helicopter articolating rotors	I-T	S. Charles Pierce, SBA	Dallas, TX
1767	Protein-based extenders compatible with shrimp	I-T	S. Charles Pierce, SBA	Dallas, TX
1768	Methods/equipment required to produce breaded product shaped like a shrimp	I-T	S. Charles Pierce, SBA	Dallas, TX
1769	SOTA, elastomeric polyurethane coatings	I-T	S. Charles Pierce, SBA	Dallas, TX
1770	SOTA, solar energy generation	I-T	S. Charles Pierce, SBA	Dallas, TX
1771	SOTA, wind energy generation	I-T	S. Charles Pierce, SBA	Dallas, TX
1772	Conversion of wind energy into useful energy	I-T	S. Charles Pierce, SBA	Dallas, TX
1773	Conversion of solar and wind energy into useful energy--especially construction of a solar unit for residential use	I-T	S. Charles Pierce, SBA	Dallas, TX
1774	Conversion of solar and wind energy into useful energy	I-T	S. Charles Pierce, SBA	Dallas, TX
1775	OSHA Act as it applys to small business firms	I-F	Dr. Tom McRorey, SOSU	Durant

SEARCH NUMBER	SEARCH SUBJECT	SIC	CLIENT	LOCATION OF CLIENT
1776	Human factors in quality control	I-S	Saijon Mettiyawonyse, SOSU	Durant
1777	Employment trends, Carter County	I-S	Ben Da-Vi Yang, SOSU	Durant
1778	Compact microfilm processor	I-S	William Yu-chi Ting, SOSU	Durant
1779	Teaching machines	I-S	Vongsri Lertkitcha, SOSU	Durant
1780	Operation of in-house records center	I-S	Oliver Kou, SOSU	Durant
1781	Cryogenic fluid for pipeline repairing	I-S	Thowat Metharonarath, SOSU	Durant
1782	Uses of holography	I-S	Rathakorn Kingsak, SOSU	Durant
1783	Solar cells	I-S	Archup Taygongpanta, SOSU	Durant
1784	Human stress in organizations	I-S	Lei-Chu Chang, SOSU	Durant
1785	Liquid hydrogen as a fuel	I-S	Jaime Gallegos, SOSU	Durant
1786	Status of emergency medical service	I-S	Anchana Viuekaphirat, SOSU	Durant
1787	Business airplane purchase consideration	I-S	Foustino Carmona, SOSU	Durant
1788	Temperature control systems in the Concorde	I-S	Bizhan Matin, SOSU	Durant
1789	Private aviation safety	I-S	M. I. El-Fakih, SOSU	Durant
1790	Joining and sealing dissimilar materials	I-S	Wirut Supavong, SOSU	Durant

SEARCH NUMBER	SEARCH SUBJECT	SIC	CLIENT	LOCATION OF CLIENT
1791	Laser technology	I-S	Prapin Boonpalah, SOSU	Durant
1792	Housing requirements vs. national resources	I-S	Sithiporn Chaichon, SOSU	Durant
1793	Three-dimensional laser doppler system	I-S	Pongsak Sangkaew, SOSU	Durant
1794	Human stress	I-S	Suraphong Buncherdlux, SOSU	Durant
1795	Cost estimation	I-S	Srisanga Kingsak, SOSU	Durant
1796	Corrosion control	I-S	Wisonu Nivesmarintra, SOSU	Durant
1797	Use of downhole pressure gauges for oil/gas reservoir analysis	I-T	S. Charles Pierce, SBA	Dallas, TX
1798	SOTA, downhole pressure gauges	I-T	S. Charles Pierce, SBA	Dallas, TX
1799	Conversion of solar energy and wind energy to useful energy	I-T	S. Charles Pierce, SBA	Dallas, TX
1800	Conversion of solar energy to useful energy	I-T	S. Charles Pierce, SBA	Dallas, TX
1801	SOTA, energy conservation; especially of natural gas in steel door manufacturing plant	I-T	S. Charles Pierce, SBA	Dallas, TX
1802	Various methods of energy conservation in a manufacturing plant	I-T	S. Charles Pierce, SBA	Dallas, TX

SEARCH NUMBER	SEARCH SUBJECT	SIC	CLIENT	LOCATION OF CLIENT
1803	Specialty paints/coatings effectively used to abate nuclear power plant radiation exposure	I-T	S. Charles Pierce, SBA	Dallas, TX
1804	New materials, organic and inorganic, that offer specific resistance to a radioactive environment	I-T	S. Charles Pierce, SBA	Dallas, TX
1805	Conversion of solar energy into useable energy for heating and air conditioning	I-T	S. Charles Pierce, SBA	Dallas, TX
1806	Spot-welding methods and equipment	I-T	S. Charles Pierce, SBA	Dallas, TX
1807	Valve technology	I-T	S. Charles Pierce, SBA	Dallas, TX
1808	Conversion of solar energy into useful energy for heating and air conditioning	I-T	S. Charles Pierce, SBA	Dallas, TX
1809	Newest methods and/or equipment used to measure natural gas flow rate	I-T	S. Charles Pierce, SBA	Dallas, TX
1810	Food additives	I-S	SOSU Debate Team	Durant
1811	Information on soil survey techniques	I-T	S. Charles Pierce, SBA	Dallas, TX
1812	Soil surveys that relate to vegetation and geology	I-T	S. Charles Pierce, SBA	Dallas, TX
1813	Individual sewage disposal systems	I-T	S. Charles Pierce, SBA	Dallas, TX
1814	Aerobic type sewage disposal plants/septic tanks	I-T	S. Charles Pierce, SBA	Dallas, TX

SEARCH NUMBER	SEARCH SUBJECT	SIC	CLIENT	LOCATION OF CLIENT
1815	Adhesive plastic binder material to be mixed and used with aluminum oxide ceramics	I-T	S. Charles Pierce, SBA	Dallas, TX
1816	SOTA, availability of nuclear batteries or other high-temperature batteries	I-T	S. Charles Pierce, SBA	Dallas, TX
1817	Aluminum oxide waste disposal	I-T	S. Charles Pierce, SBA	Dallas, TX
1818	New methods and equipment used in welding steel, stainless steel, and monel pressure vessels	I-T	S. Charles Pierce, SBA	Dallas, TX
1819	Sources of information on energy conservation in various industrial plants and government agencies	I-T	S. Charles Pierce, SBA	Dallas, TX
1820	Detection of drugs in blood and urine in both humans and animals	I-T	S. Charles Pierce, SBA	Dallas, TX
1821	Ventilation systems suitable for venting/emitting caustic fumes	I-T	S. Charles Pierce, SBA	Dallas, TX
1822	Cooling or air conditioning devices used for workers out-of-doors	I-T	S. Charles Pierce, SBA	Dallas, TX
1823	Thin film technology including microwave integrated circuits	I-T	S. Charles Pierce, SBA	Dallas, TX
1824	Thin film technology including surface acoustical wave devices with aluminum film used for oscillators	I-T	S. Charles Pierce, SBA	Dallas, TX

SEARCH NUMBER	SEARCH SUBJECT	SIC	CLIENT	LOCATION OF CLIENT
1825	Methods and equipment used to distribute or transport liquid petroleum, gasoline, and liquid or slurried coal	I-T	S. Charles Pierce, SBA	Dallas, TX
1826	Possibility of generating permanent internal stresses in ceramic substrate material by differential heating	I-T	S. Charles Pierce, SBA	Dallas, TX
1827	Rankine-cycle forward and reverse engines adapted for electrical power	I-T	S. Charles Pierce, SBA	Dallas, TX
1828	SOTA, water flood methods or systems	I-T	S. Charles Pierce, SBA	Dallas, TX
1829	Latest methods of secondary recovery for petroleum oil and gas	I-T	S. Charles Pierce, SBA	Dallas, TX
1830	Methods and equipment used to eliminate cadmium and chromium from electroplating waste water	I-T	S. Charles Pierce, SBA	Dallas, TX
1831	Conversion of wind energy into useful energy	I-T	S. Charles Pierce, SBA	Dallas, TX
1832	Use of molecular spectroscopy for the detection and measurement of hydrogen sulfide	I-T	S. Charles Pierce, SBA	Dallas, TX
1833	Use of ozone and ozone generators in the purification of water	I-T	S. Charles Pierce, SBA	Dallas, TX
1834	Conversion of solar energy into useful energy	I-T	S. Charles Pierce, SBA	Dallas, TX

SEARCH NUMBER	SEARCH SUBJECT	SIC	CLIENT	LOCATION OF CLIENT
1835	Information on industrial detergents, degreasers lubricants, and cooling tower water additives	I-T	S. Charles Pierce, SBA	Dallas, TX
1836	Methods and equipment used in gas chromatograph analysis of water pollutants	I-T	S. Charles Pierce, SBA	Dallas, TX
1837	Electronic instruments to measure downhole temperature and pressure in petroleum exploration and drilling	I-T	S. Charles Pierce, SBA	Dallas, TX
1838	SOTA, conversion of geothermal energy into useful energy	I-T	S. Charles Pierce, SBA	Dallas, TX
1839	EEO regulations relative to handicapped employees	I-F	Tom Vickers, SOSU	Durant
1840	Digital logic training devices	I-T	S. Charles Pierce, SBA	Dallas, TX
1841	Steam or oil piping expansion joint design	I-T	S. Charles Pierce, SBA	Dallas, TX
1842	Materials or seal materials to be used in high temperature, high pressure rotating shafts in geothermal wells	I-T	S. Charles Pierce, SBA	Dallas, TX
1843	Methods for identification and testing of coliform bacteria in wastewater and drinking water	I-T	S. Charles Pierce, SBA	Dallas, TX
1844	Air handling system for the movement of bulk materials	I-T	S. Charles Pierce, SBA	Dallas, TX

SEARCH NUMBER	SEARCH SUBJECT	SIC	CLIENT	LOCATION OF CLIENT
1845	Detection, metholodogies, and techniques for pesticide analysis in drinking water	I-T	S. Charles Pierce, SBA	Dallas, TX
1846	Colorimetric indicator tubes for detection and/or identification of gases	I-T	S. Charles Pierce, SBA	Dallas, TX
1847	Hydroponics	I-S	Ali-Behuejad, SOSU	Durant
1848	Use of cathodic protection of pipelines	I-T	S. Charles Pierce, SBA	Dallas, TX
1849	Plating waste water treatment and recovery system to remove chromates and cyanides	I-T	S. Charles Pierce, SBA	Dallas, TX
1850	High temperature lubricant to use for instrument bearing in an atmosphere of steam	I-T	S. Charles Pierce, SBA	Dallas, TX
1851	Use of methonal as an alternate power source	I-F	Tom Vickers, SOSU	Durant
1852	Sources of Methonal	I-F	Tom Vickers, SOSU	Durant
1853	Methods and equipment to remove solid wastes from a chrome plating operation	I-T	S. Charles Pierce, SBA	Dallas, TX
1854	Potential markets for coal known to contain high sulfur content	I-O	Pat Breedlove	Durant
1855	Various types of solar collectors and solar-collector coatings currently being utilized in the solar energy field	I-T	S. Charles Pierce, SBA	Dallas, TX

SEARCH NUMBER	SEARCH SUBJECT	SIC	CLIENT	LOCATION OF CLIENT
1856	Production techniques for connecting 40 awg nichrome wire to untinned copper wire of varying sizes	I-T	S. Charles Pierce, SBA	Dallas, TX
1857	SOTA, equipment to remove chromic acid and other acid fumes resulting from a chrome plating operation	I-T	S. Charles Pierce, SBA	Dallas, TX
1858	Radiation effects of nuclear energy on rigid polyurethane foam with a vinyl coating outside	I-T	S. Charles Pierce, SBA	Dallas, TX
1859	Conversion of energy, especially systems used in hydroponic growth of fruits and vegetables	I-T	S. Charles Pierce, SBA	Dallas, TX
1860	Bending sheet metal and metal coil handling equipment	I-T	S. Charles Pierce, SBA	Dallas, TX
1861	Rapid oxidation or burning of polyurethane foam	I-T	S. Charles Pierce, SBA	Dallas, TX
1862	EEO information on position description for academic employees	I-F	Gary Wells, University of Tulsa	Tulsa
1863	Stack gas testing equipment and procedures resulting from burning coal	I-T	S. Charles Pierce, SBA	Dallas, TX
1864	Thin film technology including tantalum nitride resistors and nichrome resistors	I-T	S. Charles Pierce, SBA	Dallas, TX
1865	Extractable water sampler	I-T	S. Charles Pierce, SBA	Dallas, TX

SEARCH NUMBER	SEARCH SUBJECT	SIC	CLIENT	LOCATION OF CLIENT
1866	Design and use of a dip paint system to coat electrical control boxes with water-base enamels	I-T	S. Charles Pierce, SBA	Dallas, TX
1867	Technique for using tin/gold to seal Kovar lids to hybrid packages	I-T	S. Charles Pierce, SBA	Dallas, TX
1868	Edge around techniques for thick film hybrid ceramics	I-T	S. Charles Pierce, SBA	Dallas, TX
1869	Energy conservation in a manufacturing plant	I-T	S. Charles Pierce, SBA	Dallas, TX
1870	Solar collector panels	I-T	S. Charles Pierce, SBA	Dallas, TX
1871	Conversion of solar energy	I-T	S. Charles Pierce, SBA	Dallas, TX
1872	Early detection systems for fire	I-S	SOSU Debate Team	Durant
1873	Net positive suction head pumps	I-T	S. Charles Pierce, SBA	Dallas, TX
1874	Drive shaft design information for high speed pumps relating to thrust/torque requirements	I-T	S. Charles Pierce, SBA	Dallas, TX
1875	SOTA, centrifugal pumps utilizing an impeller and used to pump liquids	I-T	S. Charles Pierce, SBA	Dallas, TX
1876	Noncorrosive materials or corrosive protection for pumps	I-T	S. Charles Pierce, SBA	Dallas, TX
1877	Controlling humidity where coatings inside tanks are being applied	I-T	S. Charles Pierce, SBA	Dallas, TX

SEARCH NUMBER	SEARCH SUBJECT	SIC	CLIENT	LOCATION OF CLIENT
1878	Glass polishing/beveling equipment	I-T	S. Charles Pierce, SBA	Dallas, TX
1879	Computerized programs for design of pressure vessels, pipe flexibility, pipe expansion joints or pipe expansion bellows	I-T	S. Charles Pierce, SBA	Dallas, TX
1880	Fluorocarbon impregnation of metals	I-T	S. Charles Pierce, SBA	Dallas, TX
1881	Thermal insulation	I-O	Calvin Richert	Sulphur Spring, AR
1882	Conversion of wind energy into useful energy	I-T	S. Charles Pierce, SBA	Dallas, TX
1883	Solar collectors in conversion of solar energy to useful energy	I-T	S. Charles Pierce, SBA	Dallas, TX
1884	Solar collectors	I-T	S. Charles Pierce, SBA	Dallas, TX
1885	Solar energy	I-F	Kathleen Meadows, SOSU	Durant
1886	Use of LIDAR systems in oceanography	I-S	Lynn McDaniel, SOSU	Durant
1887	Solar energy as it relates to heating	I-S	Wilford Tate, SOSU	Durant
1888	Composites	I-S	SOSU Debate Team	Durant
1889	Hydrophonics	I-S	Ali Behnejad, SOSU	Durant
1890	Corrosion control techniques	I-S	Greg Lynn, SOSU	Durant

SEARCH NUMBER	SEARCH SUBJECT	SIC	CLIENT	LOCATION OF CLIENT
1891	Wind energy	I-S	M. Mehdi Montazerghaem, SOSU	Durant
1892	Laser technology	I-S	Lily Ma, SOSU	Durant
1893	Conversion of wind energy into useful energy	I-T	S. Charles Pierce, SBA	Dallas, TX
1894	Laser technology in metallurgy	I-S	Mokhtar Saeidnia, SOSU	Durant
1895	Conversion of solar energy into useful energy	I-T	S. Charles Pierce, SBA	Dallas, TX
1896	SOTA, development of geothermal energy	I-T	S. Charles Pierce, SBA	Dallas, TX
1897	Use of solar energy in the heating and air conditioning industry	I-T	S. Charles Pierce, SBA	Dallas, TX
1898	Conversion of wind energy into useful energy	I-T	S. Charles Pierce, SBA	Dallas, TX
1899	Utilization of solar energy	I-S	Homayoun Naeli, SOSU	Durant
1900	Establishment of sanitary wastefills and industrial waste sites	I-T	S. Charles Pierce, SBA	Dallas, TX
1901	Disposal or elimination of battery acid waste	I-T	S. Charles Pierce, SBA	Dallas, TX
1902	Disposal, reclamation and/or recycling of solid wastes	I-T	S. Charles Pierce, SBA	Dallas, TX
1903	Conversion of solar energy into useful energy	I-T	S. Charles Pierce, SBA	Dallas, TX

SEARCH NUMBER	SEARCH SUBJECT	SIC	CLIENT	LOCATION OF CLIENT
1904	The design of windmills and/or wind changers	I-T	S. Charles Pierce, SBA	Dallas, TX
1905	Wind energy generation	I-T	S. Charles Pierce, SBA	Dallas, TX
1906	Physical stress from excessive weight loss	I-S	Doug Anlty	Hendrix
1907	Solar energy; solar collectors and collector coatings	I-T	S. Charles Pierce, SBA	Dallas, TX
1908	Conversion of solar energy into useful energy	I-T	S. Charles Pierce, SBA	Dallas, TX
1909	Conservation of energy in a manufacturing plant	I-T	S. Charles Pierce, SBA	Dallas, TX
1910	Wind power as alternate energy source	I-T	S. Charles Pierce, SBA	Dallas, TX
1911	Solar energy	I-F	Austin Hamilton, SOSU	Durant
1912	Recycling of solid wastes	I-T	S. Charles Pierce, SBA	Dallas, TX
1913	Long-term outlook for availability of natural gas versus electric energy	I-T	S. Charles Pierce, SBA	Dallas, TX
1914	New insulation materials adaptable to residential and commercial buildings	I-T	S. Charles Pierce, SBA	Dallas, TX
1915	Purification of water using an ozone generator	I-T	S. Charles Pierce, SBA	Dallas, TX
1916	Dike dredge spoil disposal areas	I-T	S. Charles Pierce, SBA	Dallas, TX

SEARCH NUMBER	SEARCH SUBJECT	SIC	CLIENT	LOCATION OF CLIENT
1917	Pollution, spoils, plant growth and heavy metal and pesticide concentrations in dike dredge spoil disposal areas	I-T	S. Charles Pierce, SBA	Dallas, TX
1918	Electron microscopy of laser induced ocular leisons.	I-T	S. Charles Pierce, SBA	Dallas, TX
1919	New or advanced epoxy mold release materials	I-T	S. Charles Pierce, SBA	Dallas, TX
1920	Linear predictive coding of speech	I-T	S. Charles Pierce, SBA	Dallas, TX
1921	Adaptive predictive coding of speech	I-T	S. Charles Pierce, SBA	Dallas, TX
1922	Epoxy extenders useful for extending the "pot life" to obtain a bubble free coating	I-T	S. Charles Pierce, SBA	Dallas, TX
1923	Concorde	I-S	Chamras Chaiyen, SOSU	Durant
1924	Composites	I-S	SOSU Debate Team	Durant
1925	Alternate sources of energy	I-S	Carol Scoggin, SOSU	Durant
1926	Human factors under stress	I-S	Bancha Kumjinda, SOSU	Durant
1927	Lasers	I-S	Pinyo Komalapoin, SOSU	Durant
1928	Mini-computers	I-S	Shipsukonta Tichachol, SOSU	Durant
1929	Concorde obsolescence	I-S	J. L. Dornstadter, SOSU	Durant

SEARCH NUMBER	SEARCH SUBJECT	SIC	CLIENT	LOCATION OF CLIENT
1930	Lasers in metallurgy	I-S	Sina Shamsabadi, SOSU	Durant
1931	Methanol as an energy source	I-S	Ronald Poindexter, SOSU	Durant
1932	Lasers in communications	I-S	Mohammad Donki, SOSU	Durant
1933	Human factors under stress	I-S	Somchai Dijuthanggoon, SOSU	Durant
1934	Hydrogen as a fuel	I-S	Walter Talley, SOSU	Durant
1935	Lasers	I-S	Chanthana Plianprayvra, SOSU	Durant
1936	Uses of solar energy in hospitals	I-S	P. D. Hail, SOSUS	Durant
1937	Uses of break-even analysis	I-S	Mehdi Montazenghaem, SOSU	Durant
1938	Mini-computers	I-S	Chin Po, SOSU	Durant
1939	The heat pump	I-S	Ahmad Beheshti, SOSU	Durant
1940	Solar energy	I-S	Ahmad Beheshti, SOSU	Durant
1941	Alternating current from wind energy	I-S	Max Heflin, SOSU	Durant
1942	Micro-computers	I-S	Hossein Saeedaee, SOSU	Durant
1943	Metal corrosion control	I-S	Hossein Saeedaee, SOSU	Durant
1944	Parochial schools	I-S	Homayoun Naeli, SOSU	Durant

APPENDIX C

TRANSFER AND IMPACT REPORTS

NASA

National Aeronautics and
Space Administration

Washington, D C
20546

SEP 2 1976
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Reply to Attn of JHC-2/KS:nr

August 30, 1976

Southeastern Oklahoma State University
Attn: Dr. C. Henry Gold, Director
Technology Use Studies Center
Durant, Oklahoma 74701

Subject: Contract NASW-2881

This letter serves to confirm verbal approval provided by the undersigned for your acquisition of a Model 735 TI RECON terminal to be used in accessing the NASA Data Bank.

T. Keith Sandridge
Contracting Officer

THE RANDOLPH COMPANY

1018 ROSINE STREET

HOUSTON, TEXAS 77019

(713) 526-20

March 3, 1976

ARD/PA mlk
TUC

Mr. Donal D. Grose
U. S. Small Business Administration
Region VI
1720 Regal Row
Dallas, Texas 75235

Dear Mr. Grose:

We were very pleased with the responses we received as a result of our recent request for information on materials suitable for use in downhole electrical feed through connectors. This information is currently being evaluated, along with other possible solutions to the problem.

At this stage of development we do not know if any of the materials or techniques will be incorporated in our final design. What is important to us, however, is that we are now aware of certain materials and techniques that were unknown to us prior to our request for information.

We very much appreciate your prompt response to our inquiry.

Sincerely yours,

THE RANDOLPH COMPANY

John A. Tatum, Jr. (mjp)

John A. Tatum, Jr.
Vice President

JAT: mjp

TUSC Search 1594
NASA Tech Brief 70-10580
TRANSFER 187

THE EADS COMPANY

P. O. BOX 36448 · 8020 WESTGLEN DRIVE · HOUSTON, TEXAS 77036 · 713 · 781-3000

ARD/PA
TWO

January 26, 1976

U.S.Small Business Administration
Region VI
1720 Regal Row
Dallas, Texas 75235

Attention: Mr. Donald D. Grose
Assistant Regional Director
for Procurement Assistance

Dear Mr. Grose:

Thank you for your letter of January 22 in regard to information we have requested relating to rapid sand filters.

We have found Mr. Charles Pierce to be very helpful and interested in assisting us in every reasonable way. He has given our request his prompt attention.

A significant amount of the technical information which we have received has really not applied to our product, however, there were three different publications that did apply and have proven to be very helpful.

In reply to your letter, Mr. Grose, I am pleased to advise that the service has been of value and assistance to us.

Yours very truly,

THE EADS COMPANY

Ralph Eads

Representatives for
Baker Filtration Company

RE:eg

NASA Literature Search #30892 TRANSFER 188
TUSC Search #1598
NASA Literature Search #30893
TUSC Search #1599

ESTABLISHED 1903

KEYES FIBRE COMPANY

FORMED FIBRE PRODUCTS

P. O. Box 806 New Iberia, Louisiana 70560

January 28, 1976

Donald D. Grose
U. S. Small Business Administration
Region VI
1720 Regal Row
Dallas, Texas 75235

Dear Mr. Grose,

The literature we received from Mr. Pierce of your organization is greatly appreciated.

After searching the listings received I was able to procure from various companies and organizations, technical information and training manuals.

Some of the information such as new developed methods, new alloy melting points and new alloy uses were not formally available to me. I will be able to make repairs now that before were not possible. I also will be able to prescribe different metal formulas in the manufacture of new parts so that they can be more readily repaired.

I am sure over a long time basis that the information received will greatly reduce operating costs and improve future reliability.

Sincerely,

KEYES FIBRE COMPANY

C. A. Burke
Plant Engineer

CAB/rz

NASA Literature Search #24653
NASA Literature Search #30858
TUSC Search #1597
NASA SP-5087
NASA SP-5918(01)

TRANSFER 189

El Paso Environmental Systems Inc.

January 26, 1976

ARD/PA
TUO

U.S. Small Business Administration
Region IV
1720 Regal Row
Dallas, Texas 75235

Attn: Mr. Donald D. Grose

Dear Mr. Grose;

Thank you for the letter of January 22, 1976.

The request which was made of Mr. Pierce, regarding Reverse Osmosis, and radiological waste water was my first experience with the S.B.A.

We received lists of literature from a number of sources as a result. A number of publications have been received from those sources and our basic questions have been answered.

The resulting correspondence has also placed us in a position to take advantage of new technology which may make previously experimental products candidates for commercial application.

The performance of all concerned was entirely satisfactory.

We will not hesitate to ask for assistance on similar projects in the future.

Yours truly,

Hank

H.L. Shepherd
Marketing

HLS/pan

TUSC Search #876
NASA Literature Search #30655
TUSC Search #1582

TRANSFER 190

P. O. Box 10751 123 N. Concepcion El Paso, Texas 79997 Phone (915) 779-3937

"ENGINEERED PRODUCTS"

HALL TANK COMPANY

BUCKEYE AT EAST FIFTH ST - P O. DRAWER 5787

TELEPHONE 945-3211

NORTH LITTLE ROCK, ARKANSAS 72119

December 23, 1975

A/ARD/PA
TCO

Mr. Donald D. Grose
Assistant Regional Director for
Procurement Assistance
U. S. Small Business Administration
Region VI
1720 Regal Row
Dallas, Texas 75235

Dear Mr. Grose:

Thank you for your letter of December 18, 1975, relative to material furnished by Mr. Charles Pierce, Technology Utilization Officer for the Small Business Administration, and wish to advise that the material was very informative.

We are using the material in taking a stand on incineration of solid waste by the City of North Little Rock and improvement in cost is being made, however, it appears that from the material furnished there is still no cost advantage over land fill, as long as land fill is available.

The most helpful material was the cost evaluation for individual cities for disposal of solid waste.

We appreciate the information and as far as we are concerned, this will be a continuing study.

Yours very truly,

HALL TANK COMPANY

Richard D. Hall

RDH:pgc

TUSC Search #1570 TRANSFER 191

AKD/1711-x
TUC

FRONTIER ENTERPRISES, INC.

P.O. Box 30041 Albuquerque, New Mexico 87110 Phone (505) 294-0897

6 April, 1976

U.S. Small Business Administration
Region VI
1720 Regal Row
Dallas, Texas 75235

Attention: Mr. Donald D. Grose,
Assistant Regional Director, Procurement Assistance

Dear Mr. Grose,

I have your letter of March 24, 1976 regarding information supplied to Frontier Enterprises, Inc. by Mr. Charles Pierce. I find this information quite useful, and will definitely use it in the future in my product planning and marketing.

Mr. Pierce has been of great help to me and my company in the past through his determined efforts to seek out sources of information that I needed. This is a very useful service to small businesses and I urge that it be continued.

Sincerely,

Charles L. Wright Jr.

DR. CHARLES L. WRIGHT, JR.
President
FRONTIER ENTERPRISES, INC.

CLW:nb

Transfer 192

TUSC Search #1626
NASA Literature Search #31293

Class A Benefit

713/468-4306 / 10932 old katy road / houston, texas 77043

4RD/PA 17
TCO

DPI

DIVERSIFIED
PLASTICS
INCORPORATED

April 29, 1976

U.S. Small Business Administration
Region VI
1720 Regal Row
Dallas, Texas 75235

Attention: Mr. Donald D. Grose

Re: Your letter of April 26, 1976

Dear Mr. Grose:

The technology was most helpful to DPI in gathering information about the fiberglass molding process.

I want to express our thanks to Mr. Charles Pierce in the way he responded to our request for this information. I feel that more small companies could benefit from this service.

Again, I personally want to thank you for your help.

Yours truly,

John Lewellen
President

JL/lm

Transfer 193

TUSC Search #1691
NASA Literature Search #31696

Class A Benefit

JET RESEARCH CENTER, INC.

P.O. BOX 246 • ARLINGTON, TEXAS 76010 • TELEPHONE 275-2864

ARD/PA
TUC

March 26, 1976

Donald D. Grose
ARD/PA
Small Business Administration
Regional Office
1720 Regal Row
Dallas, TX 75235

Dear Mr. Grose:

The assistance provided by Mr. Charles Pierce has been exceptional in information content. The bibliographies and reports obtained through Mr. Pierce's efforts have been directly applicable to our current technical problems.

The amount of travel and other expense planned to obtain the same information has been almost eliminated.

I would like to express my appreciation for this assistance and hope to make use of it in the future.

Very truly yours,

John A. Regalbuto
Technical Director

Transfer 194

TUSC Search #1624
NASA Literature Search #31205

Class A Benefit

EFM
ELECTRONIC
FLO-METERS,
INC.
P.O. BOX 38269
DALLAS, TEXAS 75
TELEPHONE 214-34
TELEX 73-0406

13 September 1976

ARD/PA
TA 0

Mr. Donald D. Grose
Assistant Regional Director
for Procurement Assistance
U. S. Small Business Administration
Region VI
1720 Regal Row
Dallas, Texas 75235

Subject: Technology Utilization

Dear Mr. Grose:

We found Mr. Pierce very cooperative and your program beneficial to EFM.

We have been applying both the fluorocarbon impregnation and the Triballoy material to our products.

Very truly yours,

John C. Boykin
Executive Vice President

JCB:jh

cc: Mr. Charles Pierce

Transfer 195

NASA Lit. Search #31481
TUSC Search #1681

OK.L

8-16-76

MR. Charles Pierce
S.B.A
1720 Regal Row
Dallas, Tx 75235

Transfer 196

TUSC Search #1804
NASA Lit. Search #33059

DEAR Charles :-

MANY Thanks for the loan of the enclosed AD-267-890 REPORT, we had a complete XEROX COPY made of IT. Our DR RAY Hurd has helped us to digest the information to solve many problems we had here on MATERIAL compatability under nuclear envionment.

Eight years ago when the S.B.A. AT San Antonio refused to help me financially To start "Weed Instrument Co" I was more determined than ever to succeed.

MONEY CAN be given AND TAKEN AWAY bUT not Knowledge, you have given us invaluable Knowledge we may hit our first $1,000,000.00 year because of the knowledge you have given us. As you know Elgin is a small Town of 3850 people and I feel They Thank you as warmly as I do, we hire local people and spend money here. I feel Uncle Sam Thanks you Too, you see we now anticipate payment of our taxes and even loaned him $80,000.00, we bought some bonds with some surplus cash we had. Thank you so much! Rudy A. Martinez

W. Allen Brazell

P.O. Box 26575
Houston, Texas 77207

(713) 644-6590

June 15, 1976

ARD/PA
TAO

Mr. Donald D. Grose
ARD/PA
Small Business Administration
Region VI
1720 Regal Row
Dallas, Texas 75235

Transfer 197

TUSC Search #1706
TUSC Search #1707
TUSC Search #1709
TUSC Search #1710
TUSC Search #1711
TUSC Search #1712

Dear Mr. Grose:

It was a pleasant surprise to hear from you by your letter of May 21. Probably you do not recall, but we met about five years ago when you headed the S.B.A. office in Houston.

Your technology program, as administered by Charles Pierce, has opened to me a treasure trove of technology in the field of cryogenic-electricity, more than I believed existed. It will save much time and money for me in research; but, paradoxically, the information is so voluminous as to place an unexpected time demand in order to give it proper examination. This I plan to do a portion at a time, as I proceed with my other tasks.

In general, your program of technology transfer appears to have great merit. It should be beneficial to many business projects, if its availability is made known sufficiently.

You probably would be interested in learning the purposes for which this technology is intended. It is to speed further development of Cryoelectric Power Systems. Enclosed is a description of this revolutionary energy discovery, also a copy of this week's edition of the Houston Business Journal which presents a feature story beginning on the front page.

In reading this material, you will see that a rare investment opportunity exists. Among your financial connections may be certain ones who would seize this opportunity, if they learned about it. Private capital of $250,000 is sought. If you would like to have one, I can furnish a prospectus.

If this new business venture is of interest to you in any respect, please let me hear from you. And thanks again for your assistance.

Most cordially,

W. Allen Brazell

MICROPAC INDUSTRIES, INC.

905 E. Walnut St.
Garland, Texas 75040

Phone (214) 272-357
TWX 910-860-518

October 8, 1976

ARD/PA
TAO

Mr. Donald D. Grose
Assistant Regional Director
U. S. Small Business Administration
Region VI
1720 Regal Row
Dallas, Texas 75235

Dear Mr. Grose:

In reference to your letter, I have evaluated the literature search information provided through the S. B. A. The most useful information was the NASA literature search No. 32890, on Thin Film Technology. The search contained relavent information as shown:

379	related, non applicable
44	directly applicable articles
423	total articles

Thank you very much for the information supplied.

Sincerely,

Ron Ogan

Ron Ogan
Thin Film Products Manager

RO:cs

Transfer 198

NASA Lit. Search #32860
NASA Lit. Search #32890
TUSC Search #1864

A/ARD/PA Title
TAO

MICROPAC INDUSTRIES, INC.

905 E. Walnut St.
Garland, Texas 75040

Phone (214) 272-
TWX 910-860-

November 16, 1976

Donald D. Grose
U.S. Small Business Administration
Region VI
1720 Regal Row
Dallas, Texas 75235

Dear Mr. Grose:

Just a short note to let you know that I have found your SBA service is a great source of information.

Of the four topics which I requested information, I received thorough information and help. Along with the information I received, of which I had asked for, I was also able to apply to and solve a half a dozen other problems.

If I were asked to rate your service, I would have to rate the effectiveness of your Technology Program very high.

Thanks again for your promptness and thoroughness.

Very Sincerely,

J. P. Bradley
cm

J.P. Bradley
Manager Manufacturing Engineering

JPB/cm

Transfer 199

TUSC Search 1826
TUSC Search 1867
TUSC Search 1868
NASA Lit. Search #33176
NASA Lit. Search #33180

U.S. SMALL BUSINESS ADMINISTRATION
REGION VI
1720 REGAL ROW
DALLAS, TEXAS 75235

November 5, 1976

Mr. William A. Moore
W. A. Moore Engineering Co.
P.O. Box 5282
San Antonio, Texas 78201

Dear Mr. Moore:

Recently Mr. Charles Pierce, Technology Utilization Officer for the Small Business Administration, supplied your firm with information concerning solar energy research and development with special applications for air-conditioning and heating of residential and commercial buildings.

In order for us to evaluate the effectiveness of our Technology Program, we would encourage any comment you may have regarding this service. We are especially interested to know if you have found the information useful or plan to use it in the future. Instances of technology transfer resulting in saving of time, effort and funds or new product development would be of special benefit in assisting management to judge the success of the program.

We enjoyed working with your firm again and should you have future technical requirements, do not hesitate to contact Mr. Pierce.

A self-addressed envelope is enclosed for your reply.

Sincerely,

Transfer 200

TUSC Search 1123
TUSC Search 1307
NASA Lit. Search #24950

Donald D. Grose
Assistant Regional Director
for Procurement Assistance

Enclosure

Excuse the informality, but we're out of a secretary at the moment. We must be mentioned regularly, that's paramount. We probably will want to get it again with the more further. Thank you.

A/ARD/PA Attn
TAO

FINISHING CORPORATION

4138 SHILLING W
DALLAS, TEXAS 752
FE 9-71

Sept. 24, 1976

Mr. Donald D. Grose
ARD/PA, Region VI
1720 Regal Row
Dallas, Texas 75235

Dear Mr. Grose;

We have been receiving the information supplied by Mr. Charles Pierce. Information regarding Conversion of Solar Energy was very interesting. Hopefully, we plan to pursue some of tne ideas presented. Energy conservation will be a continuing problem therefore I am sure we can use all the information available in this field. Disposal of solid waste is not as great a problem as we thought it would be so please eliminate this category of information. The City of Dallas is helping us on this problem.

Information you have supplied is appreciated. Our firm will endeavor to use all information received.

Sincerely,

Edgar J. Wicker

Edgar J. Wicker
President

EJW/bh

NASA Lit. Search #32644
NASA Lit. Search #32645
NASA Lit. Search #32649
TUSC Search #1817

Enviro-Med Laboratories, Inc.
P. O. BOX 1362 - RUSTON, LOUISIANA 71270 - 318-255-0060

1 20 76

Mr. Pierce:

Thank you so much for the enclosed book. I am sorry for the delay.

We sincerely appreciate all your assistance.

Ron Flanary

NASA Lit. Search #33143
TUSC Search #1845
NASA Lit. Search #33142
TUSC Search #1843
NASA Lit. Search #33127
TUSC Search #1820

A/ARD/PA Tech
TAO

U.S. SMALL BUSINESS ADMINISTRATION
REGION VI
1720 REGAL ROW
DALLAS, TEXAS 75235

December 1, 1976

RECEIVED
DEC 6 1976

Mr. L. E. Wilkerson
Edahow Electronics, Inc.
P.O. Box 6721
Roswell, New Mexico 88201

Dear Mr. Wilkerson:

Recently Mr. Charles Pierce, Technology Utilization Officer for the Small Business Administration, supplied your firm with information concerning:

1. Energy conservation in various industrial plants.
2. Conversion of solar energy into usable energy.
3. Methods of secondary recovery for petroleum oil and gas.
4. Electronic instruments available to measure down-hole temperature and pressure.

In order for us to evaluate the effectiveness of our Technology Program, we would encourage any comment you may have regarding this service. We are especially interested to know if you have found the information useful or plan to use it in the future. Instances of technology transfer resulting in saving of time, effort and funds or new product development would be of special benefit in assisting management to judge the success of the program.

Since this SBA service is in its infancy in this area, it is felt that a frank evaluation will also assist us to further improve the quality of our effort. A self-addressed
for your reply.

NASA Lit. Search #33233
NASA Lit. Search #33235
TUSC Search #1819
TUSC Search #1805
NASA Lit. Search #33228
TUSC Search #1828
TUSC Search #1829
NASA Lit. Search #33242
TUSC Search #1837

Sincerely,

Donald D. Gr
Assistant Re
for Procur

Enclosure

8 Dec 76 Mr. Grose; we did receive the material -- it was of GREAT help to us. We will contact Mr. Pierce again when the need arises. Many thanks for your help and kind assistance in this program of ours.

Vee Suiaunoa, Secretary to L. E. Wilkerson

U.S. SMALL BUSINESS ADMINISTRATION
REGION VI
1720 REGAL ROW
DALLAS, TEXAS 75235

A/AED/FA MEV
TAO

December 2, 1976

Mr. Alan Muller
Stress Technology & Products, Inc.
P.O. Box 35599
Houston, Texas 77035

Dear Mr. Muller:

Recently Mr. Charles Pierce, Technology Utilization Officer for the Small Business Administration, supplied your firm with information concerning:

1. Computerized programs for design of pressure vessels, pipe flexibility, pipe expansion joints or pipe expansion bellows.

2. Assistance in running and understanding COSMIC Program No. MFS 12622.

In order for us to evaluate the effectiveness of our Technology Program, we would encourage any comment you may have regarding this service. We are especially interested to know if you have found the information useful or plan to use it in the future. Instances of technology transfer resulting in saving of time, effort and funds or new product development would be of special benefit in assisting management to judge the success of the program.

Since this SBA service is in its infancy in this area, it is felt that a frank evaluation will also assist us to further improve the quality of our effort. A self-addressed envelope is enclosed for your reply.

Sincerely,

NASA Lit. Search #33310
TUSC Search #1879

Donald D. Grose
Assistant Regional Director
for Procurement Assistance

Enclosure

Dear Mr. Grose,

Yes, they were most helpful to us and I certainly did appreciate their assistance. I still am very interested in the availability of the software that the U.S. Government developed in the area of stress analysis.

Very truly yours,
Alan Muller

ARD/PA E

TAO

D - CO - INC.
ENGINEERS - CONTRACTORS
POST OFFICE BOX 5362 • SANTA FE, NEW MEXICO 87501 • TELEPHONE (505) 983-1594

December 3, 1976

Mr. Donald D. Grose
Assistant Regional Director for
Procurement Assistance
U. S. Small Business Administration
Region VI
1720 Regal Row
Dallas, Texas 75235

Dear Mr. Grose:

D-CO-INC. was grateful to receive the solar energy literature and bibliographies.

We were interested in pursuing leads on direct energy conversion and obtained the necessary references from the bibliographies furnished.

Again, we thank you for your prompt assistance.

Very truly yours,

ARTHUR E. JUDD
President, D-CO-INC.

AEJ/eh

NASA Lit. Search #33060
TUSC Search #1774

MAGNA COOL CORPORATION
I-10 Lobdell Exit Road
P. O. Box 606
PORT ALLEN, LOUISIANA 70767

Anywhere

December 7 1976

A/ARD/PA Little
TAC

Mr. Donald D. Grose ARD/PA
U.S. Small Business Administration
Region VI
1720 Regal Row
Dallas, Texas 75235

Dear Mr. Grose,

We at Magna Cool have found your service very helpful. Our main interest, which has been fully met, was to gain as much information as possible on the state-of-the-art in the catogories mentioned. As technology is advancing very rapidly in these areas, I wounder if we could request print outs for 1976 only? This would give a good picture of the most recent work by, say February 1977.

A reasonable percentage figure for each source impact on our total information availability would be;

SBA Generated readouts;	65%
Louisiana state Univ.Library:	20%
U.S. Patent office Washington:	15%

Another important aspect of your work here is that many of the large computer files, and associated personnel, got to see us. Feedback came from several government related projects which are interested in the same areas that we are, and could be potential users of hardware in the future.

If we had tried to approach all of the various suppliers of information individualy, I belive we would have fallen far short of result you produced. Your knowledge of the right addresses and techniques greatly expanded our total information in the subject areas, and we thank you.

Very truly yours,

John W Johnson
Technical Director
Magna Cool Corporation

NASA Lit. Search #33243
TUSC Search #1822
NASA Lit. Search #33236
TUSC Search #1877
NASA Lit. Search #33229
TUSC Search #1827
NASA Lit. Search #33234
TUSC Search #1808

A/ARD/PA
TAO

fann Instrument Corporation
4826 MEADOWCROFT STREET • HOUSTON, TEXAS 77042 • P. O. BOX 42

December 14, 1976

U.S. Small Business Administration
Attn: Donald D. Grose
Assistant Regional Director
1720 Regal Row
Dallas, Texas 75235

Dear Mr. Grose:

The information on high temperature seals supplied by Mr. Charles Pierce is very helpful and greatly appreciated.

Thank you for your cooperation.

Sincerely,

James D. Fann

JCF/rs

NASA Lit. Search #33297
NASA Lit. Search #33306
TUSC Search #1838
TUSC Search #1842
NASA Lit. Search #33489

12-27-76

U. S. GOVERNMENT
SMALL BUSINESS ADMINISTRATION
REGION VI
1720 REGAL ROW
DALLAS, TEXAS 75235
214/749-2218

December 23, 1976

Mr. Augie Moore
Technology Use Studies Center
Southeastern Oklahoma State University
Durant, OK 74701

Dear Augie:

Enclosed are six SBA Forms 487, representing 16 case studies, and letters of evaluation resulting from information furnished to TU clients by this office. A search and/or other technical information from TUSC was a part of the information furnished in each case.

Thanks again for your part in making the TU Program a success in our area.

Sincerely,

S. Charles Pierce
Technology Assistance Officer

Enclosures

ENVIRONMENT IMPROVEMENT
CASE HISTORY REPORT SERVICE

FREED PUBLISHING COMPANY • P O BOX 1144, FDR STATION • NEW YORK, NEW YORK 10022 • (212) 753-2769

September 1975

FISH UTILIZED IN WASTEWATER RECLAMATION SYSTEM

A new wastewater purification system now being developed at Durant, Okla. will utilize aquatic plants and rough fish, including carp, suckers, catfish, shad, crawfish, and fresh water mussels and clams. The water reclamation plant is patterned after a system that has been used successfully by the Bavarian Power Co. in Munich, Germany for the past 25 years. The Chinese used similar systems as far back as 400 B. C.

Wastewater from Durant's existing primary and secondary treatment facility (after the standard filtration process) will run through a series of six lagoon ponds where fish will eat the nutrients and shellfish will lower the concentration of organic matter. It is estimated the ponds will handle 1.5 million gallons per day. The water will be held for 72 hours before it is released into nearby Mineral Bayou, and then into two rivers. Officials say the towns located downstream should receive potable water capable of meeting the U. S. Environmental Protection Agency standards that go into effect in 1976.

An old refining building has been converted into a fish hatchery. Over 3000 lbs. of fish are now available, which is about 10% of the capacity of the lagoon system.

A biology professor at Southeastern Oklahoma State University in Durant, Dr. Frank Wade, drew up the plans for the new low-budget system; much of the work was done by biology students. Officials consider it a pilot project which they believe will have application for other municipalities with a population of 15,000 or less.

For more information, contact: Bill Dodd, Industrial Specialist, Technology Use Studies Center, Southeastern Oklahoma State University, Durant, OK 74701.

ooo

Cooke County Environmental Agency
Cooke County Court House
GAINESVILLE, TEXAS 76240
(817) 665-3902

January 13, 1976

Dr. Frank Wade
Southeastern State College
Durant, Oklahoma 74701

Dear Sir:

We are interested to learn of the German water sewage treatment system that appeared in the May/June 1975 issue of "Journal of Environmental Health".

Have you a working model of such a system? Can existing septic tanks be utilized for primary and secondary treatment of sewage effluents? May I visit your facility?

There are several communities in this county in dire need of sewage disposal systems. All are less than 500 population in rural areas and the ponding system could be an answer to their sewage problems.

We would appreciate knowing if the German system can be a practical system for such small communities.

Very truly yours,

P. C. Sparks

P. C. Sparks
Sanitation Inspector

TECHNOLOGY USE STUDIES CENTER

January 22, 1976

Mr. P. C. Sparks
Cooke County Environmental Agency
Cooke County Court House
Gainsville, Texas 76240

Dear Mr. Sparks:

Dr. Wade referred your letter of January 13, 1976, to our Technology Use Studies Center (TUSC) for reply. TUSC is a NASA-sponsored research information retrieval and dissemination point in this locality. We provide Dr. Wade and his conservation students with various research reports concerning water purification methods, aquatic plant and animal life; and cooperate with Dr. Wade in his efforts to perfect the wastewater treatment project here in Durant.

Enclosed is background information about Dr. Wade's work and a schematic drawing of the University's Wastewater Project. The University and especially Dr. Wade's people would be most pleased to have a group of people from your Agency or Cooke County visit the water treatment facility.

Dr. Wade advises that Tuesday is the best day of the week for him, schedule-wise, and he recommends that you arrange your visit any Tuesday before April (He has received an invitation to visit five countries in South America to discuss aquaculture and wastewater management.).

We look forward to your visit. Thank you for your inquiry.

Sincerely,

Bill Dodd
Industrial Specialist

BD/sw
Enclosures

SOUTHEASTERN OKLAHOMA STATE UNIVERSITY DURANT, OKLAHOMA 74701 PHONE 405-924-0121

APPENDIX D

GENERAL AVIATION NEWS LETTER

File
News Letter
Correspondence

TECHNOLOGY USE STUDIES CENTER

January 20, 1976

Mr. Roy G. Bivins, Jr., Manager
Industrial Applications Centers (Code KT)
NASA Headquarters
Washington, D. C. 20546

Dear Roy:

As you know, the TUSC General Aviation News Letter is designed primarily at a technical level which would be appropriate for a State Aeronautics Board member or other layman who has a responsibility for decisions affecting aviation but who does not have a means for keeping himself current in the research and development in aeronautics. We believe our effort is meeting this goal.

However, I was a bit surprised and considerably pleased when Auggie Moore, editor of the News Letter, showed me a note he had received from Clint Johnson, TU officer at the Hugh L. Dryden Flight Research Center.

It appears from Clint's note (a copy of which is attached) that even the more sophisticated clientele in aeronautical R&D are finding the letter interesting and informative. This is more than we had anticipated. We will continue to produce a letter on the technical level as described in the first paragraph, but we did want to share with you the interest that has been exhibited by the Flight Research Center personnel.

Best wishes.

Sincerely,

Henry

C. Henry Gold
Director

CHG/sgw
Enclosure

cc: Mr. Louis Mogavero
Mr. Roy M. Voris

SOUTHEASTERN OKLAHOMA STATE UNIVERSITY DURANT, OKLAHOMA 74701 PHONE 405-924-0121

9 JAN 1976

AUGIE M. MOORE
EDITOR,
AVIATION-TECHNICAL NEWS
S.E. OKLAHOMA STATE U.

DEAR AUGIE:

I RECEIVED A VERY FINE COMPLIMENT ON YOUR LATEST TECH NEWS PUBLICATION FOR ITS GENERAL HIGH-INTEREST CONTENT & TECHNICAL ACTIVITIES COVERED.

THE INDIVIDUAL THAT OFFERED THE COMMENT FURTHER ASKED THAT HIS NAME BE ADDED TO YOUR MAILING LIST. HE WANTS TO CIRCULATE THE PAPER AMONG THE MEN THAT HE SUPERVISES & OTHERS IN OPERATIONS ENGINEERING.

HIS NAME:

PERRY V. ROW
CHIEF, FLIGHT TEST
ENGINEERING & SUPPORT DIV.
HUGH L. DRYDEN FLIGHT
RESEARCH CENTER
BOX 273
EDWARDS, CALIF. 93523

NOTE NEW NAME →

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia
23665

NASA

Reply to Attn of 139A

February 10, 1976

Mr. A. M. Moore, Editor
General Aviation Technical News Letter
Technology Use Studies Center
Southeastern Oklahoma State University
Durant, OK 74701

Dear Mr. Moore:

With regard to your letter of January 27, 1976, I understand that Mr. Shivers talked to you. I am sure they will now respond to your request.

Mr. Floyd R. Bryant provided the following information:

> "In reference to our telephone conversation on February 3, NASA TN D-8118 describes the preliminary design of an optically coupled digital altitude encoder and retrofitting encoders to general aviation type altimeters. Due to drastic curtailment of funds, phases of the planned development program were omitted. As stated in the report, follow-on work is needed to optimize the design, particularly in the retrofitting interface. Due to limited funds, this phase of the program was omitted. I have no information in regard to possible builders of 'encoder kits.' The idea and report are available to anyone interested in pursuing the idea and building kits.
>
> "A cost analysis was also omitted due to limited funding; therefore, I have no basis on which to quote figures on the cost of encoder kits. No, there are no statements in the report that I wish to modify. I have had no new inputs since the report was written and, due to funding, do not intend to pursue the program further."

Sincerely,

Axel T. Mattson
Industrial Applications Coordinator
NC/STRC-NASA Langley Research Center

5-14-76

ALAN

THIS TN IS AN UP-DATE & MORE-EXPLANATORY VERSION OF THE TN (7831) WRITTEN ON THE FORTRAN PROGRAM.

THIS IS A VERY SIGNIFICANT ADVANCE IN FLIGHT TEST TECHNIQUES & ENABLES A DESIGNER TO EXTRACT DERIVATIVES DIRECTLY FROM FLIGHT DATA.

* I HAVE RECEIVED A VERY FAVORABLE RESPONSE FROM YOUR AUTHORITIES.

CLIFF

School Committee of the City of Boston

East Boston Technical School

A modern secondary school center
for science and technology
312 Border Street
East Boston, Massachusetts 02128
June 25, 1976

Electronics Technol
Aviation/Aerospace Technol
Computer Technolo
Environmental Technolo
Medical Technolo

Dear Sir:

We would very much like sent to us copies of your instructional materials titled THe TUSC News for our new Technical School in East Boston.

Thank you very much; please mail to the above address with attention to Mr. Domenic Amara.

Sincerely,

Susan H. Alexander

Susan H. Alexander

Administrative Assistant

SA/pr

NASA (804) 827-2855

CHARLES MICHAEL BENJAMIN
Aeronautics Education Specialist
Assistant Professor
California State University, Chico, CA 95926

NASA - LANGLEY RESEARCH CENTER (MS - 480)
Langley Station, Hampton, Virginia 23365

GODDARD SPACE FLIGHT CENTER
GREENBELT MARYLAND 20771

LLOYD H. ARONSON
AEROSPACE EDUCATION SPECIALIST

SPACEMOBILE PROGRAMS

9-14-76

Annie- These two persons would like to be added to your mailing list for Aviation Technical News-

Los Angeles Aircraft Division
Rockwell International

International Airport
Los Angeles, California 90009
(213) 670-9151

August 12, 1976

Aviation Technical News
Southeastern Oklahoma State University
Durant, Oklahoma 74701

Attention: A. M. Moore, Editor

Dear Sir:

As the NASA HI-MAT technology representative, I made a recent trip to Edwards Air Force Base to discuss our technology utilization plans with Mr. Clint Johnson, the technology utilization officer of that Center. He suggested that I contact you and get on the distribution list for the Aviation Technical News. If this is possible, please send the newsletter to:

Mr. H. A. Kenyon, D/411, AB85
Rockwell International Corporation
Los Angeles Aircraft Division
Los Angeles International Airport
Los Angeles, California 90009

Thank you for your consideration in this matter.

Very truly yours,

ROCKWELL INTERNATIONAL CORPORATION
LOS ANGELES AIRCRAFT DIVISION

H. A. Kenyon
HI-MAT Technology Representative

HAK:vw

OCT 13 197[illegible]

EMBRY-RIDDLE AERONAUTICAL UNIVERSITY
Regional Airport
Daytona Beach, Florida 32014
904/252-5561

October 7, 1976

Dr. A. H. Moore, Editor
Aviation Technical News
Southeastern Oklahoma State University
Durant, Oklahoma, 74701

Dear Dr. Moore:

Having read several issues of your Aviation Technical News, and having found it useful and interesting, I would like to be put on the mailing list for future copies.

Embry-Riddle Aeronautical University has a developing Research Center which was initially sponsored by Dr. George R. Wallace, a New England industrialist with a strong personal interest in aviation. Your publication carries information which is always of interest to the people associated with our research programs.

Enclosed is a brochure on the Center, and a complimentary copy of our annual Aviation Research Journal.

Yours very truly,

M. W. Johnson
Technical Consultant
George R. Wallace Research Center

Incl.

/mlm

City of Westfield, Massachusetts

BARNES MUNICIPAL AIRPORT
Westfield, Mass. 01085

Airport Department
LARRY W. HEDRICK, A.A.E.
Airport Manager
(413) 568-8517

December 16, 1976

Technology Use Studies Center
Southeastern Oklahoma State University
Durent, Oklahoma 74701

Gentlement:

Please be advised I am taking the time out of an over-burdened work schedule to drop you a line to compliment your organization for an exceptionally fine Aviation Technology News Publication.

I always read your publications with much interest. Keep up the good work!

Best regards,

BARNES MUNICIPAL AIRPORT

Larry W. Hedrick, A.A.E.
Airport Manager

/s

Technology Use Studies Center
Southeastern State College
Durant, Oklahoma 74701

Area Code 405 --- 924-0121
Ext. 2517

Found for QSR 10/16/76

To: CHG from Moore

I called Dr. Richard Downs at JSC (Houston) last week in regard to a report which came out in '68 and was repeated in March of '76------ same subject but a different number.
Downs was out but his telephone recorder asked that the caller go ahead with the message and that Downs would return the call later.

Downs called me today (Mon Oct 18.)He had a copy of my letter of '68 to HQ in hand. I had written of the significance of TN D 4327 in regard to aircraft accidents. Downs furnished a copy of my letter to the AF during an investigation of an F-111 accident in Con. wherein the airplane inadvertantly dropped full fuel tanks while flying over Con. The AF asked for the full report I had referred to in my letter to HQ. Now the AF has made a full investigation of their maintenance proceedure for electrical systems due to the report. Dr. Downs was complimentary that TUSC had realized the significance of 4327 back in '68 and that it took years for others to realize what the report had said

BENSEN

SPEED-GRAM

P. O. Box ~~2746~~ 31047
RALEIGH, N C. 27602
U. S. A.

FOR BENSEN AIRCRAFT CORPORATION 12/29/76

AM MOORE, EDITOR "AN. TECH. NEWS"

TECHNOLOGY USE STUDIES CENTER
Southeastern Oklahoma State University
Durant, Oklahoma 74701

YOUR STAFF AND/OR READERS MAY BE INTERESTED IN THE ATTACHED INFO. KEEP UP THE GOOD WORK!

DR. IGOR BENSEN, P. E.
P. O. BOX 31047
RALEIGH, N. C. 27612

PROMPT, RELIABLE SERVICE IS OUR TRADEMARK

27 Dec 76

12-30-76

Mr. A.M. Moore,

I think you are doing an outstanding job with your Aviation Technical News.

I find the newsletter very interesting and informative as well as providing material of great interest to Maryland pilots.

Please keep up the good work,

Sincerely,

M. E. Cox

Aviation Education Spec.
State Aviation Admin.
Box 8755
BWI Airport
Maryland 21240

Ted Poyser

12/30/76

Mr. A.M. Moore, Editor
AVIATION TECHNICAL NEWS --

Mr. Moore:

Thanks for sending us "Aviation Technical News", vol. III, #4.

Since we run a small aviation publication ourselves, we would be delighted to quote from your own communication, and give credit, of course. We would appreciate any other issues that might bring us up-to-date to speed as far as content of your own writing is concerned. In particular, would you tell us how you come to be related to NASA. And, finally, do you want us to publish your Oklahoma address for possible expansion of your reader list? What would be the cost to those who ask for Aviation Technical News?

Regards,

TED

E. W. "TED" POYSER
Publications Editor

213-655-7890

VOI-SHAN
A DIVISION OF VSI CORPORATION
8463 HIGUERA STREET, CULVER CITY, CALIFORNIA 90230
TELEPHONES (213) 836-[illegible]

AVIATION TECHNICAL NEWS
Published by Technology Use Studies Center

SOUTHEASTERN OKLAHOMA STATE UNIVERSITY

DURANT, OKLAHOMA 74701
AREA CODE (405) 924-0121 EXT. 413

SPONSORED BY THE TECHNOLOGY UTILIZATION DIVISION, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

January 17, 1977

Mr. E. W. Poyser
Publications Editor, VOI-SHAN
8463 Higuera Street
Culver City, California 90230

Dear Mr. Poyser:

You are welcome to use any material from our News Letter with or without credit to us. We would like to have more readers and we would appreciate your mentioning the fact in your publications subject to the explanation below. There is no charge for the News Letter.

Our job is to interpret NASA technical reports for laymen. We aim for the person who may have an interest or even a responsibility in aviation without a means for remaining current in aviation developments. We do not write for engineering level personnel.

The University has been associated with the Technology Utilization division of NASA since 1964. NASA was being criticized, during the Apollo days, for ignoring the first "A" in their name. The Technology Use Studies Center, a contractor to the TU division of NASA, suggested a "news letter" in the format now used. NASA gave us the go-ahead and we have been doing the letter as a line item in a larger contract for about three years. We draw upon professors in the science departments and the aviation people connected with the Department of Aerospace at the University for technical help quite often.

You will note that most items in the letter reference a NASA Contractor Report or a NASA Technical Note. These references are given so that any of the writers on our mailing list can secure the report and develop a full article from the report if he cares to do so.

I appreciate your interest in our publications efforts and trust that I have answered your questions.

Sincerely,

A. M. Moore
Editor

AMM/sgw

AVIATION TECHNICAL NEWS
Published by Technology Use Studies Center

SOUTHEASTERN OKLAHOMA STATE UNIVERSITY

DURANT, OKLAHOMA 74701
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SPONSORED BY THE TECHNOLOGY UTILIZATION DIVISION NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Volume III, No. 4 December 1976

FIRE HAZARD (TN D-4327 & TN D-8177)

The fire which took the lives of three astronauts in January of 1967 triggered an intensive study of the procedures associated with countdown and launch and the materials used in the vehicles. One of the findings during this study could possibly explain some "gremlin" activity which has plagued electrical maintenance people for many years.

Silver-coated cooper wire (MIL-W-7139 and MIL-W-8777) has been widely specified for communication, navigation and armament systems in aircraft since the late thirties. It resists corrosion and has desirable conducting characteristics. Before 1967 it was not known that a genuine fire hazard was present if glycol came in contact with the conducter. Glycol contacting the conductor at a terminal or through a fault in the insulation generates a current which can be picked up on a radio as noise. Glycol solutions have been used for anti-icing and defrosting. Laboratory tests demonstrate that a flame will occur in seven minutes or less if glycol is applied to the wire. The fire hazard is present if the conductor is carrying a current. If there is no load on the wire, a "stray" current will be generated by exposing the conductor to glycol. Manufacturers are now adding a silver chelating agent to glycol to prevent this hazard.

The phenomenon probably explains why some airplanes coming out of the climatic hangar at Eglin AFB were problem airplanes. It also might be a factor in the inadvertent ejection of stores from fighter bombers. The phenomenon has likely produced many write-up squawks on radio systems.

SIMULATOR

Study of Capabilities, Necessary Characteristics and Effectiveness of Pilot Ground Trainers (FAA-RD-127 and AD #755681, 280 pages)

This study was conducted to evaluate the effectiveness of pilot ground trainers along with actual flight instruction to develop primary aeronautical skills. Procedures and maneuvers discussed in the report are for private, commercial, and instrument certificates.

Different types of ground trainers were combined to provide equipment for the experiment, including outside visual, no outside visual, motion, and fixed pictorial ground trainers.

Generally, the results indicate that high altitude airwork, instrument maneuvers and procedures can be taught effectively in the ground trainer, whereas instruction in ground reference maneuvers and VFR cross-country procedures are ineffective.

One obvious advantage cited by the instructors is "that a student does not fear a ground trainer and learns basic fundamentals rapidly." A disadvantage noted by the instructors is "fixation on instruments inside aircraft during flight, tending to ignore traffic."

In summary, the report indicates that some maneuvers and procedures in the private, commercial, and instrument syllabus can be taught effectively and efficiently in pilot ground trainers.

--Ross Ritz

THEY COME TO SOUTHEASTERN OKLAHOMA STATE TO FLY

Durant, Oklahoma, the home of SOSU, is not exactly a hub of transportation and it takes a bit of doing to get here except by automobile or airplane. One international student arrived by taxi from Oklahoma City...about 150 miles. Tim Ballog and his mother rode a bus from Stow, Ohio, to look over the Aviation Department...well over 1,000 miles one way. Bill Stearns rode his bicycle from Louisville, Kentucky, about 1,500 miles. Tom Bullard, a flight operations manager from Fort Worth, brought a young cousin to SOSU to get him enrolled in Aerospace; however, it was Tom who enrolled. Lyle Birdwell flew his own airplane in from Porterville, California. Gary Sides and his wife came in from Greeley, Colorado, in their camper.

REDISTRIBUTION/CREATION

The following is an excerpt from Congressman Don Fuqua's speech made recently before a meeting of the American Astronautical Society:

We need to enlist grass-root involvement and support which will require imagination, new creative ideas, and hardwork. As you know there are direct and beneficial relationships between the space programs and the growth of our economy. Our capability to deal with national needs, our ability to deal with challenges of the environment and limited natural resources of earth, and our standing among the nations of the world will be favorable or adversely affected by how we utilize space. WE MUST GAIN A PUBLIC UNDERSTANDING THAT DISBURSING TAX DOLLARS TO EFFECT SOCIAL CHANGE INVOLVES THE REDISTRIBUTION OF EXISTING WEALTH WHEREAS SPENDING TO EFFECT TECHNOLOGICAL CHANGE INVOLVES THE CREATION OF NEW WEALTH.

GASP CONDUCTS OZONE MEASUREMENTS FROM BOEING 747 AIRLINERS

(Ref: TN D-8311)

We have witnessed several years of emotionally-charged debate over the possible effect of aerosols and SST flight operations upon the Earth's ozone layer. NASA's Global Atmospheric

Sampling Program (GASP) now seeks to replace the emotions with factual information as a basis for future decisions. GASP has been conducting ozone measurements in the upper troposphere and lower stratosphere on a continuing basis, and early results were reported in a recent NASA Technical Note.

The program used instrument packages mounted in four conventional Boeing 747 commercial airliners operating on scheduled global and transcontinental flights. Flight routes were chosen to provide large variations of latitude and longitude, effectively covering much of the planet.

The heart of the instrument package is a sensitive ozone detector, which records ozone levels at timed intervals. Ozone, a chemical derivative of ordinary oxygen, absorbs ultraviolet light strongly, and the detector operates by passing a beam of ultraviolet light through outside air samples. It is the same ultraviolet absorbing property of ozone which protects Earth's plants and animals from the sun's deadly radiation.

Data obtained by GASP during 1975 are in agreement with earlier balloon-borne experiments, thus demonstrating the reliability of the method. Atmospheric ozone content was found to increase markedly upon ascending from the troposphere into the stratosphere.

GASP ozone readings were also reported over a range of latitudes in the flight altitude range between 10.5 and 11.5 km (6.5 and 7.1 statute miles). It was noted that the ozone content at latitudes greater than 30° tends to be higher than at lower latitudes, and fluctuations were also considerable at the higher latitudes. For example, ozone content varied on an arbitrary scale between approximately 1.5 and 18 units at latitude 50°. On the same scale and at latitudes less than 30°, the variations were only between 1.0 and 2.5 units (approximately).

Other results of the program include the finding of a parallel between stratosphere temperature and ozone content and evidence that there is more ozone over low pressure (cyclonic) weather areas. The continuing program is expected to provide valuable insight into upper altitude phenomena and is producing reference data which will permit future detection of any human-induced alterations of Earth's ozone layer.

--Dr. John Wright

CRIME AND PUNISHMENT

Since 1968, all terrorists who have committed depredations against civil aviation and who have been caught in the act have been released--apart from those imprisoned in Israel. The total number freed, despite their crimes, is 85. They were partners in perpetrating 29 hijackings and strikes against aircraft and four attacks on airports. As a result of their crimes, more than 200 innocent persons lost their lives and hundreds more were injured.

(Gad Yaacobi, as quoted by Armed Forces Journal, October 1976)

Any comments, suggestions, or criticisms you wish to share with us are always welcomed.

LIQUID HYDROGEN AIRPORT REQUIREMENTS
(Langley Research Center)

Lockheed completed a comprehensive study of the technical and economic feasibility of converting San Francisco International Airport to a liquid hydrogen fueling operation for wide-bodied transport aircraft in the late 90's (NASA CR-2700). Boeing did a similar analysis on converting O'Hare International, Chicago (NASA CR-2699). Both studies presumed that airlines would be using 400 passenger 5500 NM range jet aircraft.

It appears that aeronautic research people no longer have doubts about the feasibility of fueling jets with LH. They recognize, however, that handling the stuff on a routine basis may pose some problems. Both studies agree that insulated piping, pipe joints, and connections require the most development of any of the technical aspects of the system. A more economical system of extracting and compressing gaseous hydrogen from coal is likewise a problem. Lockheed projected that LH could be put into the aircraft at a cost of 40.3 cents per pound. (The same cost analysis for JP type fuel would begin with the cost of crude to the refinery, refining, delivery to the airport, storing and then the cost of putting it into the aircraft.) These studies were not made from the viewpoint that LH systems would be the ONLY option for transport energy; they were made to demonstrate that there ARE options if we don't wait too long. Lockheed arrived at the 40.3 cost per pound by allocating the cost thusly: liquifying/storage 308.6; distribution system, 5.8; piping/valves, 25.6; hydrant fueler vehicles, 0.4. Now multiply these figures by $\$10^6$. Total cost at one airport, 340.4 x $\$10^6$.

Characteristics of LH you might have forgotten: It weighs about .6 pounds per gallon, and it yields 2-1/2 times more energy than an equivalent weight of JP. It takes about 3.8 gallons of LH to produce the energy that one gallon of JP produces.

BATHTUB AND THE 747
(Norman Cousins, NASA EP 125)

"In order to answer the question 'why explore?', then, it becomes necessary to refer to the phenomenon of human progress. I have a theory that progress is what is left over after one meets an impossible problem. The reason it is safer to travel in a Boeing 747 than to sit in your bathtub is that adequate thought has been given to all of the things that can go wrong when you are in a 747 and not enough thought to what can go wrong in a bathtub. When you are in a 747, the experts relieve you of the responsibility for making correct decisions. This is something that does not happen in your bathtub. What I am trying to suggest is that the more difficult and complex the undertaking, the more likely it is that knowledge will be gained that can be applied more fruitfully far beyond the undertaking itself. Viking I is such an undertaking."

This newsletter is not published on a fixed calendar basis. When TUSC has received research results affecting general aviation to a significant degree, we try to get the information to our readers.

BOGGING DOWN

There is no substitute for a good idea in any business, especially if it is reinforced with wings. A notable case occurred recently at SOSU, where the idea was due to biologist Dr. John Taylor. John has been exploring Southeastern Oklahoma's natural geological formations known as "hanging bogs" with the thought that they might contain plants not previously found or expected in the State.

The bogs occur upland near the beginnings of small streams but are kept in a wet condition due to ancient accumulations of dead plants and water seeping in from underground sources. John and others think these may have provided a nearly constant environment since the last ice age, a belief now reinforced by John's recent discovery of plants normally found hundreds of miles to the southeast.

The original idea was to obtain aerial photos of known bogs and then match them with wide area statellite photographs in a search for others. Reference photography was easily accomplished from a Cessna 150 flown by SOSU chemist John Wright and only one flight was necessary.

After seeing two or three of the known bogs from the air, their visual characteristics became established. Suddenly the things appeared everywhere. John Taylor ran out of film while the pilot was kept busy marking positions on cut up copies of county maps.

Some of the new bogs measured up to 0.4 kilometers in length, and the three most interesting were selected for immediate surface exploration. The results were satisfying. At this writing, the new bogs have yielded thirteen species ordinarily expected in the bayou countries of Louisiana, Arkansas, and southeast Texas. Two other species are pending classification. Obviously, a new chapter is being written for the botany of Oklahoma.

Once again, the utility of the airplane has been demonstrated, if it ever needed that. John Taylor has found 31 plant species new to Oklahoma over a several year period, but a single flight and two days hiking accounted for 42% of that total.

--Dr. John Wright

ENERGY SHORTAGE

The tragedy of our Civil War disrupted whale oil production and its price shot up to $2.55 per gallon, almost double what it had been in 1859. Naturally there were cries of profiteering and demands for Congress to "do something about it." The government, however, made no move to ration whale oil or to freeze its price, or to put a new tax on "excess profits" of the whalers who were benefiting from the increase in prices. Instead, prices were permitted to rise. The result, then as now, was predictable. Consumers began to use less whale oil and the whalers invested more money in new ways to increase their productivity. Meanwhile men with vision and capital began to develop kerosene and other petroleum products.

(From "The Whale Oil, Chicken and Energy Syndrome," a speech by Walter B. Wriston)

A. M. Moore, Editor